FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Food in War

BY THE time these lines appear the sound of the joy-bells will have died down. During the past fortnight we have seen

> Our stern alarums changed for merry meetings,
> Our dreadful marches to delightful measures.

We have praised famous men and joined in the apotheosis of the common man and woman, soldier and civilian.

This is no time to recapitulate, except in the briefest of terms, the vicissitudes of the food front. They are recorded in the pages of FOOD MANUFACTURE, 1939-1945.

We have observed, at first hand, the food industry in action in its different branches and no praise could be adequate for the way it carried on under difficult and often unexpected conditions.

Adequately to comment upon the birth and growth of the Ministry of Food would need a volume. Criticism there has been—nothing can be so well done that it could not have been better done. But the most captious critic cannot but admit that it has not been a bad job.

The inhabitants of this island, mercilessly attacked by air and sea, at no moment suffered the pangs of hunger. Those who exercised the inalienable prerogative of Britons to grumble did so in their characteristic humorous way. In the food queues the realisation that it was lucky to have something to queue for always alleviated the botheration.

The Black Marketeer has been with us:

> A fellow by the hand of nature marked,
> Quoted and signed, to do a deed of shame,

but his machinations have been comparatively limited and not much harm done.

The ingenious opportunist found considerable scope in the production of food substitutes. As a result, solemn hours and days were spent in the Courts during which the best legal and scientific minds were occupied in deciding what, among other things, was a "cordial" and what was not.

The welfare of the next generation has not been neglected. War-time children have probably ab-

sorbed more vitamins than any other children before them.

The biochemists have been busy and the science of nutrition has probably advanced at a greater pace during the past quinquennium than in any other.

The food manufacturers are ready with blueprints of post-war developments.

There are colossal tasks ahead. The immediate problem of world food supplies was the subject of a preliminary statement about the Washington conference held between representatives of Great Britain, Canada, and the United States, which says that the problem of food is one of the most urgent facing the United Nations. Liberated areas must be fed until they can re-establish their own agriculture. This will require transport, fuel, fertilisers, feeding-stuffs, and machinery.

In the Home field, the protagonists are assembling for the battle of controls, and shortly we shall see the first round fought in Parliament. There will be wigs on the green over subsidiary matters such as wheat extraction, milk pasteurisation, and others.

In addition to all these preoccupations there is still Japan to beat. The programme is a full one.

The New Milk Order

The supply of milk for manufacture is brought under fuller control by the Milk (Control and Maximum Prices) Order, 1945, which came into operation last month. Article 11 of the Order provides that: "Milk may not be obtained by or supplied to a manufacturer except under and in accordance with the terms of an authorisation granted by or on behalf of the Minister (of Food) either to the manufacturer or his supplier." This is one of the major modifications made by the new Order.

A number of milk factories are operating at the present time as liquid milk depots, and some of them will be affected by the decision of the Ministry of Food that dairy farmers shall no longer be responsible for milk during transit when it is redirected by the buyer from the place of delivery mentioned in the contract.

Hitherto, when milk delivered to a buyer's depot was re-directed to another depot without being unloaded, the producer continued to be responsible for the milk until it reached the second depot. A new provision contained in Clause 4 of the first schedule to the Order states that in cases where milk is re-directed in such a manner, the property and risk in the milk shall be deemed to have passed to the buyer when the milk arrived at the place of delivery fixed by the Minister of Food in the contract.

Moreover, under the new Order, if milk be delivered, without the consent of the Ministry, to any place other than that named in the contract, the buyer is not entitled to reject it or to make any claim in respect of it unless the buyer can prove that the milk was defective when it left the farm.

Milk crates are now subject to control in the same way as milk churns. The maximum retail price of homogenised milk has now been fixed at the same rate as for T.T. milk—namely, 5d. a pint (3s. 4d. per gallon) throughout England and Wales. Hitherto the retail price has been related to the price charged in 1941 in different areas. The new Order is a consolidating measure. It supersedes all the previous Ministry of Food Orders relating to the sale and distribution of milk with the exception of the Milk (Hours of Delivery) Order, which forbids the delivery of milk by retail in certain areas before 7.30 a.m.

The National Loaf

Differences in the average composition of home-grown and Canadian wheats, which are used in the National loaf, were revealed by Lord Listowel in reply to a question in the House of Lords. He said that home-milled flour used in the National loaf was of 80 per cent. extraction both from home-grown and imported wheat. The extraction rate of imported flour was around 75 per cent., but this flour was not used separately in the production of National bread. Imported flour was generally incorporated with home-milled flour so as to form 15 per cent. of the total product. In Scotland a further 12½ per cent. of imported flour was permitted in certain varieties of National bread.

The vitamin and mineral content of wheat depended upon the variety, but even with the same variety it might vary from year to year. In a recent investigation, carried out jointly by the Department of Medicine, Cambridge, and the Cereals Research Station, St. Albans, average figures were obtained on samples of home-grown and Canadian wheat. The latter formed the bulk of our imported wheat. The results of the investigation, expressed as parts per million, were:

	Canadian Wheat.	*Home-grown Wheat.*
Vitamin B_1	3·6	3·0
Riboflavin	1·7	1·7
Nicotinic acid ...	55	48
Iron	38	30
Calcium	275	355
Magnesium	1,410	1,060
Zinc	37	32

The imported flour mixed with home-milled flour was almost entirely Canadian. Analyses last year of a number of samples of this flour gave the following results:

Vitamin B_1, 3·0; riboflavin, 0·75; nicotinic acid, 14; iron, 11.

Replying to a subsequent question, Lord Clifden

said that the present overall extraction of National flour for bread-making, allowing for the addition of Canadian flour, was 79·25 per cent., except in the case of Scottish batch bread, where it might fall to 78·6 per cent. Calcium and iron were the only minerals for which routine analyses were carried out. The average contents of these minerals in either the English or Scottish loaf were 610 and 12·5 parts per million respectively. The loaf that contained 85 per cent. extraction home-produced flour also contained Canadian flour, and the corresponding figures were 620 and 17 parts per million.

Misleading Statements

Certain statements made by the Earl of Portsmouth in the debate in the House of Lords on the Wheat Content of Bread which took place on February 28 have occasioned considerable comment. These statements are certainly misleading and may damage the goodwill of a reputable firm.

Referring to Bemax, Lord Portsmouth gave the decided impression that it was manufactured at the expense of the nutritive value of bread, to be sold "at something like a hundred times the price which they (certain vitamins) would cost if they had been left in the loaf." This is entirely misleading and evidently the noble Lord has not read carefully enough the Flour Order 1945 S.R. & O. (1945) No. 1. There, on page 4, is given a specific definition of National flour to be used for bread-making, and it states clearly "it shall contain the *maximum quantity of wheat germ* which having regard to the type of milling plant can be included in such flour."

On the same page is given a definition of "M" flour. "M" flour means "flour conforming in all respects to the definition of National flour except only that such flour does not contain the maximum quantity of wheat germ which could have been included therein." This flour must not be used for bread-making in any circumstances. It is meant to be used for manufacturing purposes in which the presence of germ would be useless and the valuable constituents thereof wasted. It is largely employed in the manufacture of self-raising flour, which has a *p*H value on the alkaline side to such an extent that the vitamin B_1 would soon be destroyed. It is far better that the germ be extracted and converted into such a product as Bemax, or other medicinal preparations, that ensure all the valuable components being rendered entirely available to the human diet.

If Lord Portsmouth had studied the numerous flour Orders and the strict regulations imposed on millers he would have seen that all flour for bread must contain the maximum possible amount of germ, and we hope he will realise the unjustness, to the manufacturers of Bemax, of his misleading statement that its existence is only possible at the expense of bread.

The real truth is that such products as Bemax, far from robbing us of a valuable source of vitamins, actually are salvaging this most important material that would otherwise be entirely wasted as a direct source of vitamins for human beings and in certain cases would be irretrievably lost.

Even the noble Lords should realise that a little learning is a dangerous thing and that in matters like this we should be told the whole truth and nothing but the truth.

Chocolate Sponge Mixture

In his annual report for 1944, Dr. G. H. Walker, City Analyst, Salford, records his examination of a brand of pre-packed Chocolate Sponge Mixture which was found to contain only 1·4 per cent. of dry fat-free cocoa. A sponge pudding prepared according to the directions on the carton contained only 0·56 per cent. of dry fat-free cocoa and was completely devoid of any detectable chocolate flavour. In the analyst's opinion, the minimum amount of dry fat-free cocoa which will give a satisfactory colour and flavour of chocolate is 10 per cent. in the sponge mixture, which corresponds to approximately 4 per cent. in the finished sponge pudding. These amounts of dry fat-free cocoa correspond approximately to 14 per cent. and 5·5 per cent. of ordinary cocoa powder. On comparison with this standard both samples were deficient in dry fat-free cocoa to the extent of 86 per cent.

A standard of 4 per cent. of dry fat-free cocoa for finished chocolate confectionery is recognised by the trade, and successful prosecutions by this and other Food and Drugs Authorities have been instituted in respect of "chocolate" confectionery which did not comply with this standard. The standard for chocolate sponge mixture suggested above will give a concentration of 4 per cent. of dry fat-free cocoa in the finished sponge pudding, and is, therefore, based upon a standard which has already been accepted for chocolate confectionery. In view of the fact that a chocolate flavour was almost entirely absent from the samples under discussion, it was felt that legal proceedings should be recommended, and at the hearing of the summons the packers pleaded "guilty" and were fined £5 and £2 2s. costs.

Labelling of Ice Cream

The Ministry of Food has intimated that most of the provisions of Articles 2 and 3 of the Labelling of Food (No. 2) Order, 1944, will be applied to ice cream before the end of the present year, although Article 2(3), which requires the ingredients to be mentioned on the wrapper in order of their importance, will not operate in respect of ice cream at any time during 1945.

Under the Order, ice cream that is pre-packed

by wholesale manufacturers will have to be marked on the outside of the container with the name and address of the packer or of the firm on whose behalf it is packed. Alternatively, it may be marked with a registered trade mark. This provision is in operation from May 1, but the Ministry is prepared to grant licences to individual manufacturers authorising them to use existing stocks of labels until September 1.

Manufacturers, however, are of opinion that they will have extreme difficulty in complying with the Order in existing circumstances. The only material available for packaging pint bricks is a white-lined chipboard box. The white lining is on the inside and comes into direct contact with the ice cream. The outside of the box, it is stated, will not bear any printing; nor can adhesive labels be affixed because they would peel off as soon as the boxes are removed from the cold room or storage cabinet. A more satisfactory packaging material should therefore be made available before the Labelling Order is applied to ice cream.

Article 2(4) of the Order requires the quantity of food packed to be stated in terms of net weight or of measure, and the Ministry proposes that fluid ounces shall be used in the case of ice cream. But when ice cream begins to soften it loses some of the air that has been incorporated in it and its quantity, in terms of fluid ounces, begins to diminish. A manufacturer of pre-packed-ice cream might therefore find himself liable to a penalty in respect of ice cream that has lost bulk after he has ceased to have control over the condition in which it is stored. The Ministry, however, seems disinclined to make any further concession.

Physico-Chemical Assessment of Food Spoilage

It is a special feature of physico-chemical methods of judging the quality of foodstuffs that, once the relation between the magnitude of the physico-chemical quantity measured on the one hand and subjectively assessed "quality" on the other has been established, the former can be used for *objective* assessment of quality. Measurement of spoilage in fish and eggs by such methods is proposed in two recent American papers.

Dyer, Sigurdsson and Wood (*Food Res.*, 1944, 9, p. 183) have made use of the fact that in salt water bacterial spoilage of fish normally leads to the formation of the strongly alkaline substance trimethylamine, with consequent rise in the tissue *p*H. A strip of flesh about 3 mm. thick is cut from the surface of the fish and the *p*H of the tissue determined by applying it to a glass electrode. A high correlation between the value so obtained and the degree of spoilage as assessed organoleptically was obtained, and it is claimed that once a calibration between the *p*H value and the taste of consumers is established a limiting value above which the fish should be condemned can be arrived at. The equipment required for the test is portable and easy to use.

Romanoff and Hall (*Food Res.*, 1944, 9, p. 218) have found that the radio-frequency conductivity of intact eggs increases with time of storage, the rate of increase being greatly accelerated by a rise in temperature, and also that the radio-frequency and palatability are closely correlated.

They put forward these observations as the basis of a simple and objective method of grading eggs which should prove superior to the rather primitive "candling" at present followed.

Moisture Content of Meat Extract

The first of a short series of papers by A. R. Riddle has just appeared under this title, with the subtitle "I. The Nature of Moisture Content," in Vol. 17, 1944, of the *Journal of the (Australian) Council for Scientific and Industrial Research*, pp. 290-298. Mr. Riddle, who is an officer of the Division of Food Preservation and Transport at the Brisbane Laboratory of the Council, first reviews the methods employed in industry for determination of the moisture content of meat extract, and discusses published data. Evidence is then adduced to suggest that all the methods are likely to give differing values for the same extract—differing, that is, not only between themselves but between different determinations in which one method is employed but the temperature and time of drying are varied. Statistical evidence for these variations between methods and within methods is, however, not presented.

A discussion of the nature and origin of the returned water content follows. It is thought probable that the water set free in moisture-content estimations at 100° C., and possibly at lower temperatures, includes (i) "free" water, (ii) "bound" water, and (iii) water produced by protein breakdown. It cannot be assumed that there is any evidential difference between "free" and "bound" water; there is no dividing line between the two, and so no practical distinction can be made between them. Further, it cannot at present be stated at what temperature the water arising from protein breakdown becomes of appreciable amount. No matter whence it comes, the quantity of water evolved exhibits, when graphed, a continuous function with time; its rate of evolution changing, but no major discontinuity being apparent.

It is concluded that it is unlikely that a true and unique value for the moisture content of a meat extract, or, for that matter, of any biological product, will be attainable—a value, that is, which includes only the "free" and "bound" water. Since any one value is quite arbitrary, it is suggested as very desirable that some one method carefully defined and rigorously followed should be adopted by all concerned with the industry, including Governmental agencies.

British Beet Sugar

Part II

SPECIALLY CONTRIBUTED

Extracting and Refining

THE process of conversion from beet to bagged sugar is still largely based upon the work of Marggraff and Achard. Modern progress has been in the perfection of mechanisation rather than in the principles involved. The same process is employed in all eighteen plants (with natural variations as to volume and mechanism), so that a survey of one will suffice to indicate the general procedure.

The following is a very brief account of the processes carried out at the Scottish factory at Prestonhall, Cupar, Fife, which fulfils the essentials as to location in that it stands near a plentiful supply of water, adequate road and rail facilities, and in a central point to serve potential beet-growing land. From the River Eden 3,000,000 gallons of water are pumped daily. This is used for unloading, conveying, and washing the beet, for boiler supplies, etc. The effluent is carried off to ponds extending over 8 to 9 acres, allowed to settle, and the purified water returned to the river. The beet is grown under contract along the coastal belt from Berwick-on-Tweed to the Lothians, Fife, Angus, and Perthshire, with some slight production farther north. It is to serve these areas that Prestonhall exists. To ensure an adequate supply, the Government quota has been spread over these counties and the actual acreage per farmer allocated by the Agricultural Executive Committees.

Supply of Raw Material

Some idea of the tonnage involved in beet transport can be obtained from the official rail figures given by the L.N.E.R., which moved 118,376 wagons to 15 beet factories in 116 days, to a total weight of approximately 1,000,000 tons. The G.W.R. moved 210,000 tons to two factories in the same season. When road and rail deliveries are added together the volume is colossal.

The Cupar factory used 11,500 wagons of beet in its season alone, plus 8,500 loads of road traffic, so that, whether nationally or as individual units, the transportation of the raw materials involves a very great responsibility on the officers concerned, since any failure of transport and consequent shortage of raw material is a desperate matter indeed.

This factor of speedy conversion involves the working of the beet factories twenty-four hours per day, seven days per week, during their season of three to four months. Continuity of processing

The mixture of crystal sugar and molasses is dropped into the centrifugals. In these it is revolved at high speed and the molasses are drawn through a fine mesh, leaving pure sugar in the pan.

Courtesy of British Sugar Corporation, Ltd.

obviously depends on regularity of input, but the normal facilities of storage of raw material is denied and only by expert control of transport can the desired regularity be obtained.

After the end of the campaign the key workers retained at the factory, numbering 100 to 150, carry out an overhaul of the whole plant. Scale and juice foul the machinery to such an extent as to make this essential, while the necessity for continuous working during the four-month campaign prevents any major repairs being done during operations. For some of the off-season, pre-war, refining of cane sugar was carried on, but little of this has been possible in war-time.

Factory Management and Personnel

The factory is staffed by a local manager, controlling three main departments under an accountant, agriculturist, and factory superintendent respectively. Each has his own organisation. The accountant has charge of the office and commercial side. The agriculturist has a number of outside fieldmen who are in constant touch with the growers and visit all crops at regular intervals. The factory superintendent and his assistant superintendent have three shift superintendents, and are assisted by a chief engineer, chief chemist and an electrician.

Campaign period labour number some 500-600, largely seasonal workers in peacetime and to-day composed of all ages and both sexes. The problems involved in working with seasonal untrained labour can be appreciated by all those who have had to confront that problem. Women have very ably replaced one-third of the seasonal workers in war-time.

How the Farmer is Paid

Growers are paid on a clean beet basis and sugar content affects the price. Under a beet contract agreed with the N.F.U. and approved by the Government, the factories base the beet price on the sugar content of a sample drawn from each load.

A 28-lb. dirty sample is taken from each delivery of beet and the wagon or truck is discharged into the silos, the load and empty weight being taken, and the dirty beet weight arrived at. Each sample is identified by a serial numbered ticket and delivered to the sampling department, where it is washed in a revolving cage, any remaining dirt removed, the crown properly guillotined and the waste weighed, which allows a calculation of waste per cwt.

Ten representative beet are then taken from each cleaned sample and inserted one after the other in a machine, where a steel conical rasp takes a section from the beet, so that a truly representative sample can be obtained. The sugar content of this sample is determined by saccharimeter. On the tests for clean weight and sugar content, pricing of each load is based.

Supplying the Factory

Loads are emptied into big concrete silos with a deeper central flume or channel, water power from an Elpha hose unit flushing the beet from wagons or lorries. There are ten such silos at Cupar, one set of them with a long elevated gantry system, so that trucks can be stood above and be cleared the more easily directly into the silos below. These all join in a central channel at the yard end and flow by gravity into the factory through a trash catcher.

This is simply a continuous chain belt with teeth operating in the channel on a metal frame. It lifts leaves, weeds, and anything which flows down on the stream of beet-loaded water. Another unit, directly behind, is circular and rotates in and through the channel. Normally one of these will operate, but where conditions are particularly bad both may be used. The final control before actual entry by ground level flume channel into the factory is a wall grid which can be used to limit delivery.

Washing, Weighing and Slicing

The first main process begins when beet are lifted from the channel by a giant water wheel, electrically operated, which scoops up the dirty beet roots, elevates them and delivers them into a washing trough at first floor level.

This trough is a metal water bath, open at the top, with a centre spindle operating paddle blades, which churn the beet, cleaning it as it goes, and so motivated that the roots are delivered to a conveyor at one end, from which they are elevated to an overhead hopper, clean and free from weeds, etc. They are weighed automatically and delivered into a lower hopper which leads into the slicing machine.

The throughput of the factory can be estimated by the operation of this automatic weigher, which dumps loads at a rate of rather more than one a minute. The process of conversion is continuous and a fair estimate of the production might be 70 tons per hour for a twenty-four hour day, seven day week, over a three to four month season.

A battery of three slicing machines converts the clean weighed roots into "cossettes," long thin strips so sliced as to present the largest surface to the action of the diffusion process. The machines are large, cylindrical, hollow drums, rotating at some 63 revolutions per minute on a base which has steel knives so located that the beet, fed into the machine by conveyor, is forced down into the wall cavities, over the knives, and delivered as cossettes through a frontal delivery chute which feeds into the diffusers. The problem of maintaining adequately sharp knives for continuous use is in itself not a minor one, and with a life of perhaps

two or three hours only continuous replacement and sharpening are necessary.

Diffusion

The next process is diffusion. This depends on the fact that, by osmosis, or dialysis, the sugar is diffused from the cossettes into water, producing an impure sugar solution. By exposing the maximum surface the process is greatly facilitated.

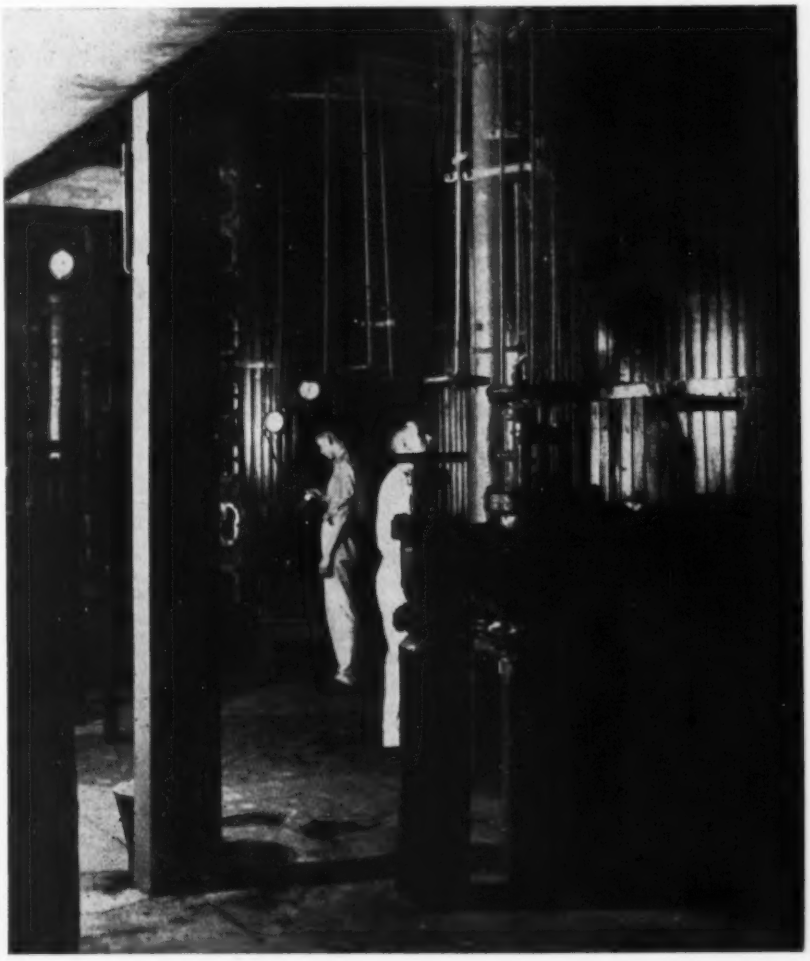
The diffuser is a horizontal cylindrical vessel, lit internally and fitted with portholes, so that the activity in any one of the compartments can be watched with ease. Each cell in the diffuser will hold approximately 4 tons of cossettes, and these are agitated by rotating fins in hot water, driven from cell to cell, until at the final stage the pulp has been driven up and the concentrated juice delivered at the other end of the diffuser. The pulp is treated in another department and becomes a valuable by-product of the industry.

Purification of Juice

After straining, the juice is ready for the second stage of the process. This is the first carbonation, intended to carry off any organic matter in the juice and leave it clear but not pure.

High-grade Buxton lime is burned with coke in huge lime kilns in the factory to withdraw the CO_2, which is caught and retained. The calcium oxide (burnt lime) so obtained is slaked with water, and the milk of lime obtained in this way is added to the juice, which is heated before treatment. The carbonation process is carried out in large tanks. A normal mixture of CaO might be 2 per cent. of the weight of the juice involved, but this varies in practice.

The carbon dioxide gas caught from the kilns is then blown into the mixture in the tanks; this reunites with the calcium oxide to form calcium carbonate, which is precipitated together with organic and other impurities.



Sugar boilers at work by their vacuum pans. In these pans the syrup is crystallised into sugar in the form of "massecuites."

Courtesy of British Sugar Corporation, Ltd.

Filtration and Evaporation

The lime and precipitated impurities are removed by passing the mixture through filter presses. The filtered juice at this stage is clear and light straw in colour, but still contains something less than 0·1 per cent. of excess lime. The majority of this is removed by a second carbonation and further filtration. The final stage in the purification of this "thin juice"—which contains about 12 per cent. of sugar—is treatment with sulphur dioxide gas and subsequent filtration. This produces a pure juice that is almost water-white and is ready for concentration.

Evaporation is carried out, at Cupar, by two sets of quintuple effect evaporators, the sugar content of the juice emerging from the last effects being about 65 per cent.

Crystallisation, Centrifugalisation, and Drying

The final boiling pans in this plant are on the top floor and presented a very definite problem in the years of blackout, since even experienced workmen found the heat too great for comfort.

Thick juice is fed into these boiling pans (an average capacity being 45 tons), which are fitted with calandrias and heated from the general steam system. The contents are concentrated to the graining point at which tiny white crystals begin to show when samples are withdrawn, and here the skill of the sugar boiler is demonstrated. By so charging his pans, the boiler can regulate the charging and operation of his pans to produce a crystal of the desired size. In two and a half hours' boiling the pans will be ready for emptying, the contents consisting of "massecuite," a mass of white crystals embedded in a brown mother liquor.

The massecuite is fed into centrifuges, which, at 1,000 revs. per minute, spin off the mother liquor, which eventually becomes molasses, through the perforated walls, leaving the mass of white sugar for final treatment, which consists of washing it with hot, distilled water and delivering it into a hopper, from which it is taken to a large conical revolving machine, where it is dried by hot air and then conveyed to the bagging department. This process of extraction will obtain 85 per cent. sugar content and over from beet, the sugar content of which varies from the standard 15½ per cent. (for which the grower receives 81s. plus or minus 3s. 4d. per ton for each 1 per cent. of sugar according to tested content) to as high as 20 per cent.

By-Products

The by-products resulting from beet sugar manufacture are extremely important and are processed in separate sections. The first is the beet pulp which was obtained from the diffuser in the form of exhausted cossettes. These still contain a small percentage of sugar and are valuable as cattle feed. They are elevated by spiral and plate conveyors to the top of the pulp house, where two processes are operated. In one, molasses is added and the mixture sent up to a drying chamber. In the other process the pulp is dried and spiralled out as pressed pulp. Each grower is entitled to a quota of dried pulp as a condition of his contract and based on his deliveries. The pulp has definite virtues, particularly in dairying, and 1 ton equals approximately 8 tons of mangolds or swedes, 1 ton of oats, 15½ cwt. barley, or 13½ cwt. of maize.

Factory Carbonate of Lime

Factory carbonate of lime is the second important by-product. It is obtained from the settling tanks after the first precipitation process and fed into ponds, where it is air-dried and then mechanically loaded for delivery to farmers, who find it invaluable for liming their land. Earlier reluctance to use lime has been gradually overcome by steady propaganda by the Ministry of Agriculture, and factory carbonate of lime is being used increasingly in beet-growing areas.

Molasses

The third by-product is the molasses, from the final processing. It can be again boiled and further sugar produced, varying according to factory and conditions operating. Molasses is the mother liquor of the lowest grade, still containing some 50 per cent. of uncrystallisable sweetening matter. It is pumped into external tanks and

A Sugar Store.

Courtesy of British Sugar Corporation, Ltd.

taken by a separate company, which refines it for various industrial purposes, constituting an industry in itself. A small proportion is used in the pulp house for admixture with the exhaustive cossettes, as already described.

Power Units

Power is almost entirely electrically operated, water being pumped from the river and throughout the factory, juice circulated between operations, and conveyors and other mechanism largely motivated by power derived from two 1,000 h.p. weir turbines operating with English electric generators.

Steam power for the operations requiring this heating method is derived from a set of ten Lancashire and four water tube boilers all automatically fed, and fitted with Lea coal meters. An essential part of the economy of operation is the use of exhaust steam wherever possible, and a fuel-saving campaign has been introduced with very satisfactory results.

Chemical Control

Chemical control is exercised at every stage by a modern laboratory, which not only carries out routine work on raw materials, as well as on the beet at every stage of conversion, but which handles a considerable volume of the statistical work in connection with the plant. Raw materials are all carefully checked, a precaution which definitely justifies the labour involved, since lime, to mention one product, can vary very considerably and affect the final product. Product tests are made hourly, another necessary precaution in a plant on continuous operation, and the finished product and by-products are all subjected to a careful and regular analysis.

The Future of the Industry

It has been pointed out that the growing of the sugar beet crop and its processing integrated agriculture and industry and improved soil fertility. Developing this theme, it has also been shown that the industry provides pure essential food products for human and animal consumption. It safeguards these to an island nation in war and helps to release valuable shipping space; in times of trade depression it gives employment on the land and in many ancillary industries. These facts surely ensure for this comparatively young industry a permanently useful place in the national economy.

The construction of its organisation is in accord with trends of modern economic thought. It is, in fact, one of the earliest examples in this country of a great industry owned and controlled by a partnership between Government and private enterprise. It has allied itself with every agency of science to promote technical efficiency in field and factory.

Volatility in Food Flavour

In the course of a paper presented by Dr. E. C. Crocker at the Harvey W. Wiley Memorial Symposium of the American Chemical Society, he said that the volatile components are often the very ingredients that give interest and character to food flavours. Any control that may be exercised over them should have great practical value. Volatile flavouring substances, on working acquaintance, turn out to be ordinary chemical substances in most respects. They have, for instance, conventional vapour pressures and hydrogen ion activities and are distingushed only by their ability to stimulate appropriately the receptors of smell and taste.

Volatile flavouring substances are of many chemical types such as hydrocarbons, alcohols, aldehydes, acids, esters, phenols, amines, and even mercaptans, variously distributed in different kinds of foods. Usually the quantities present are small, but in the skins of citrus fruits and in spices there may be too much for direct use as foods.

Frequently, the volatile flavours are associated with water in the food. As the water evaporates for any reason, as on drying during storage, on cooking, or on dehydration, there is an accompanying loss of volatile substance—a virtual steam distillation. The loss of flavour in any instance will depend upon the quantity of water evaporated and the vapour pressure of the volatile substances at the temperature of the evaporation.

Flavouring materials frequently are present in association with non-volatile fats, oils or waxes, which have pronounced retarding action on the volatility. In such instances there is physical "fixation" of the volatile materials—frequently advantageous but occasionally otherwise. One may also add less volatile substances to artificial flavours, which will act as "fixatives." These will serve as temporary fixatives, outlasting the other ingredients and furnishing useful aroma.

Volatility is also influenced by the chemical activity of flavouring substances. Those that are acidic or basic in their chemical reaction, for example, may be retained in solution while water is being evaporated if the *p*H of the solution is adjusted toward their partial chemical neutralisation. Also, some volatile substances may be held in suspended volatility, in chemical compounds such as the glucosides, later to be released as needed. Still others are slowly produced by hydrolysis or oxidation over a long period of time.

A considerable part of the complete paper, as given before the American Chemical Society, is concerned with the vapour pressures at room temperature of important flavouring substances. Means are described for measuring or calculating these values, and a table is presented comprising some 240 chemicals arranged according to 14 degrees of volatility. In making artificial flavours, using this table, one may select volatile substances having any desired degree or volatility to meet a particular situation or can select groups of substances that have a common degree of volatility, to make "blends." Many more uses can be found for such a table of selected odorants. Chiefly, however, the table is of informational value for use in dealing with the constituents of natural flavours.

Jam Manufacture

PART III

GEORGE RAUCH

THE BRITISH Food Regulations, fixing not only the minimum amount of soluble solids but also the minimum amount of fruit, have levelled the great differences which previously existed in the quality of jams. This, however, has not checked the development of individual specialities, because a new and little explored field is still open. Initiative and imaginative work may be utilised in the choice of high-quality fruits and in the blending of varieties. It is usually believed that the jam manufacturer has to be satisfied with whatever varieties he can get. This is a fallacy. It is a fact that the manufacture of jam, consuming the greater part of the raspberry, strawberry, blackcurrant and gooseberry crops, is one of the most important factors for the fruit-growing industry. The jam producer can therefore rightly expect that more attention should be paid to his particular requirements.

The policy of growing a variety for its cropping capacity alone might be excusable as a wartime expedient but will not stand up to peacetime requirements and competition. English jam manufacture enjoyed world reputation not only for its skill in jam making but for the choice fruit used in its production. The English climate is particularly kind to some fruits, as, for instance, strawberries and raspberries, whose flavours attain unmatched perfection in this country. The blending of fruit varieties could be developed to a similar perfection as in the case of tea and coffee; this becomes particularly necessary where the by-products of a canning or bottling department are used for the manufacture of jam.

As far as the choice of fruit for jam is concerned, three main factors have to be taken into consideration: (1) Variety of fruit, (2) condition of fruit, (3) suitability in regard to preparation.

The following is a short survey of the most important fruits for jam manufacture. A great number of varieties is not enumerated, but it is proposed to discuss the general considerations which make them suitable for jam production.

STRAWBERRY

The strawberry attains a very high degree of perfection in England and is superior to those grown anywhere else in the world. In selecting the right varieties, the jam manufacturer and the fruit grower face many difficult problems. The most important considerations are:

(*a*) Colour, flavour and size of fruit.
(*b*) Period of ripening.
(*c*) Cropping capacity.
(*d*) Ability to travel.
(*e*) Disease resistance.

Strawberries are very sensitive to conditions of climate and soil, and are unfortunately one of the most disease-ridden fruits. They are susceptible to the virus diseases Yellow-edge and Severe Crinkle, which are spread by the strawberry aphid (*Capitophorus fragariae*). A certain measure of control is possible by using certified stocks, which are grown under the Ministry of Agriculture Nuclear Stock Scheme. East Malling Research Station, for instance, developed parent plants which are as free as possible from disease in the varieties M 40 "Royal Sovereign," M 44 "Huxley's Giant," M 42 "Oberschlesien."

A fact of importance is that strawberry varieties react differently to virus diseases. Those classed as virus "sensitive," as, for instance, "Royal Sovereign" and "Sir Joseph Paxton," show symptoms more readily and can therefore be efficiently rogued during field inspection. Symptoms in virus "tolerant" varieties, such as "Huxley's" and "Oberschlesien," are less obvious, and efficient control more difficult.

Paxton.

Another important factor is the distance of the factory from the growing district, as the ability to travel varies with different varieties. The following properties are particularly desirable for jam manufacture:

(*a*) Small or medium size.
(*b*) Firm texture.
(*c*) Good flavour and bright colour.

Large-sized strawberries are not economical in consumption and show a tendency to float; bright red colour is important for fresh fruit jams as no artificial colouring matters are permitted for fresh fruit grades. The most popular varieties for jam making are:

The early fruiting "Royal Sovereign," "Huxley's Giant," "Sir Joseph Paxton," "Oberschlesien," "Madame Lefebre," "Stirling Castle," and "Scarlet Queen." The two last varieties were specially grown for jam making but have gradually died out. At present the "Huxley's Giant" is widely grown for canning and bottling; although its quality is not so good as the above-mentioned varieties it has a better cropping capacity.

Generally speaking, strawberries for jam making should be picked shortly before they approach full ripeness. Later varieties are of firmer texture and can be gathered full-ripe. An important consideration is always the length of time in transit. In order to prevent bruising, strawberries should be picked one by one and pickers should never be allowed to hold several berries in their hands. The keeping properties of strawberries are improved if a short stem is left on the fruit.

A great number of different receptacles are in use. They consist usually of non-returnable chips or punnets, or of returnable trays or baskets. Suitable containers are returnable cases of 24-lb. capacity. It is absolutely essential that the receptacles should not be overfilled and that at least one-half inch of free space should be allowed from the rim of the container. If lorry-borne, packages must be tightly packed and should be protected by waterproof sheets. A good thing is to construct a solidly built standard case which can be used for the transport of various fruits and, if fitted with removable partitions, for the despatch of 1-lb. or 2-lb. jars.

Strawberries arrive at the factory either with or without stems. Stalked strawberries must be processed without delay as they deteriorate quickly and the loss of juice is also considerable. In time of high pressure it is often necessary to store the fruit for a short time. Cold-storage facilities in jam and canning factories are rather rare and would be profitable only for very large enterprises. Experiments with cooling soft fruit have been successful, and pre-cooling has been found to improve the ability to travel. Otherwise, well-aired cellars are suitable storing places. Particular care should be taken that later-arrived fruit is not placed in front of earlier arrivals. This mistake frequently causes great waste. Under no circumstances should strawberries be pulped with stalks; this practice is liable to affect the flavour and invariably discolours the fruit. It is far better to sieve them straight away and use the pulp for jam mixtures—as, for instance, Apple and Strawberry, or Gooseberry and Strawberry. Strawberries on stems have to be stalked, an operation done chiefly by women at piece rates. These rates vary according to the size and condition of the fruit. An average output for medium-sized varieties in fresh condition is approximately 12 to 18 lb. per hour. Waste figures differ with the variety and condition of the fruit. In 1934, which was an average year, over 150 tons of medium-sized strawberries showed a waste of 10·9 per cent., based on the figures of the purchased and processed fruit, the waste consisting of stalks, deteriorated fruit and loss of juice. After stalking, the strawberries are ready for jam boiling, pulping, bottling or canning. Washing is necessary if the fruit is grown on sandy soil or is otherwise only dirty; in many factories the washing is omitted. For the cleaning process either specially constructed washing machines are used or the fruit is simply placed on sieves and sprayed with water.

Experiments of blending different varieties must be carried out individually in every factory. Interesting results could be obtained by blending the continental wild scarlet strawberry varieties with English-grown fruit. American pulp can also be used for blending experiments.

RASPBERRY

Raspberries are, next to strawberries, the most popular fruit for jam manufacture. Their popularity is well deserved by reason of their fine distinctive flavour. Most red varieties are suitable for jam making, as the question of firmness does not arise. Raspberries can be divided into two main varieties: (*a*) summer fruiting, and (*b*) autumn or perpetual fruiting.

The first fruit during the summer months; the latter commence with the summer varieties and last until late November. The main points to consider for jam making are flavour and colour.

"Lloyd George"—an excellent perpetual-fruiting variety—and "Norfolk Giant"—a summer-fruiting variety—are widely grown for preserving purposes. The "Lloyd George" variety is particularly susceptible to Mosaic disease and is at present widely replaced by "Norfolk Giant." This variety has a natural resistance to infection by the Mosaic disease, and shows easily visible symptoms if infected by both Mosaic and Leaf Curl disease. Certified stocks are available. "Lloyd George" is more "tolerant," and affected stools cannot be easily recognised and eradicated.

Other varieties, as, for instance, "Pyne's Royal," "Red Cross," "Devon," "Antwerp," etc.,

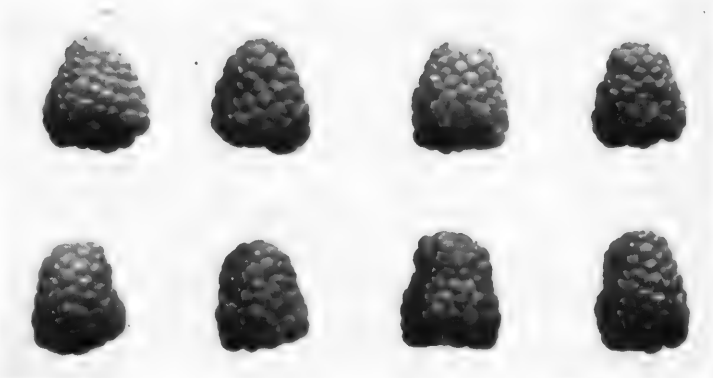
are equally good for canning and jam making, but of lesser importance owing to their lower cropping capacity. Experiments carried out at East Malling Research Station showed the following yield per acre:

"Lloyd George," 45·3 cwt.; "Red Cross," 33·5 cwt.; "Pyne's Royal," 24·6 cwt.; "Devon," 16·4 cwt.

For bottling and canning purposes raspberries must not be allowed to hang until dead ripe; they should be picked when sufficiently firm to hold the plug without spreading. For jam making, full ripe fruit picked without plugs is preferable, as some of the best varieties attain their finest flavour at this stage. Raspberries are extremely perishable and mould growth often appears a few hours after picking. Quick transit is essential. Whenever possible raspberries should be pulped on the spot.

For jam manufacture casks or tubs may be used as transport containers. They must remain unheaded, otherwise the heads are liable to be blown off if fermentation occurs. Casks have an additional advantage—they prevent waste through loss of juice. For bottling or canning, small chip or punnets not exceeding 4 lb. should be used.

After arrival at the factory, raspberries should be handled as little as possible. They must be processed as soon as they arrive. For jam boiling no further operation except weighing is necessary.



Lloyd George.

LOGANBERRY

Loganberries, so extensively used for canning and bottling, are not popular for jam making. Their high acidity causes granulation, owing to the high invert sugar percentage, which makes buffering necessary.

For canning purposes loganberries should be gathered when they are on the point of changing from red to purple. For jam making a riper stage is preferable. They must not be kept any length of time after being picked or they will go mouldy. The yield varies under different conditions from 1 ton to 4 tons per acre.

Loganberries should be packed in a similar manner to raspberries.

BLACKBERRIES

Blackberries are a very popular jam fruit and supply material for two delicious jam varieties—namely, the Bramble Seedless Jam and the Bramble Jelly. The bulk of the fruit for jam manufacture is derived from the hedge blackberry. An interesting and unexplored field for experiments is the cultivated giant blackberry and the hybrid berry. There are a great number of varieties of exquisite flavour, as, for instance, the large-fruited "Blowers," the "Himalaya Berry," a fruit of very fine flavour, and the early-fruiting "Bedford Giant." The Youngberry and the Veitchberry are both hybrids of great possibilities. The first is probably a cross between a dewberry and a loganberry, and the latter a cross between a raspberry and a blackberry. The greatest drawback to these berries is their very large seeds. Hedge blackberries are of rather a woody texture which renders them unsuitable for canning.

Blackberries attain their best flavour when fully ripe, and they should be picked at this stage.

In order to prevent the waste of fruit, casks are to be preferred to any other containers.

As with other soft fruits, blackberries should not be washed. For jelly manufacture the fruits are either pressed in hydraulic presses or the juice is extracted by boiling and subsequent filtering. It is advisable to juice blackberries at the fresh stage and not after pulping and preserving with SO_2, which invariably affects the subtle fruit flavour. It is here where firms using modern production systems, as, for instance, the Kellie-Yates filtration process, enjoy a great advantage. This system, combining the juicing and filtration processes with jam boiling, enables manufacturers to cope with large quantities of fresh fruit in the shortest possible time. For seedless bramble jam, blackberries are cooked and subsequently pulped, using a sieve fine enough to separate the seeds.

The drawback with bramble jelly and seedless jam is their lack of piquancy. This deficiency could be remedied by blending the blackberry juice with the juice of hybrid berry varieties. Here, at any rate, is a great field for experimental work.

BLACKCURRANT

The fine flavour and high dietetic value of blackcurrants make this fruit one of the most important for jam manufacture. The high natural content of ascorbic acid induced the Government to encourage the sale of this fruit in the form of blackcurrant

purée on a national scale for distribution to young children. From the point of view of the jam manufacturer almost any variety of blackcurrant is suitable for jam making. The grower, however, will choose varieties which ripen evenly so that the fruit can be gathered in one picking; some varieties make two or three pickings necessary. The best varieties for jam manufacture are the evenly ripening "Baldwin," the "Mendip Cross," "Wellington Triple Cross," and "Boskoop Giant." For canning and bottling, varieties with tender skins and a uniform size and colour are preferred.

Blackcurrants should be picked when ripe. It is of considerable importance, for both canning and jam manufacture, that the fruit should be as dry as possible.

Blackcurrants for preserving purposes are usually packed in trays or half sieves of 24-lb. capacity; less frequently they are packed into chip baskets containing 4 lb.

The fruit usually arrives at the factory unstalked. The removal of the stalk is done either by hand or by a machine known as the "picking" machine. This machine works satisfactorily if the stalks are well withered and the berries in an average condition. Over-ripe fruit, or those with very green stalks, show a considerable waste percentage. In order to preserve the vitamin C content it is absolutely essential to avoid contact with all metals except stainless steel. Copper is particularly harmful, for it acts as a catalytic agent in the oxidation of ascorbic acid. For pulping, wooden tubs may be used, but steam coils and all other utensils should be of stainless steel. For the manufacture of *purée* strigging is not necessary. All impurities have to be removed by hand, and it is advisable to use a slowly moving belt. After cleaning, the fruit is boiled with the stalks and subsequently pulped.

RED CURRANT

The red currant is of less importance for jam manufacture because the demand for this variety is limited. The flavour and piquancy of the berries renders them suitable for the production of an excellent jelly, and they are furthermore very suitable for mixtures. Red currants are usually bottled or canned together with raspberries as a mixed pack. Commercial varieties are "Fay's Prolific," "Raby Castle," and "Laxton's Perfection."

The same rules are applied for picking and packing these berries as were suggested for blackcurrants.

The fruit must be perfectly dry and in very good condition, otherwise the waste during the mechanical picking process is very considerable. It is not necessary to strigg red currants for jelly making; they may be cooked with stalks and subsequently pressed and filtered. The same applies for sieving.

GOOSEBERRY

This fruit has very fine properties which make it very suitable for the manufacture of jam. Unfortunately the demand for gooseberry jam is declining. Although for marketing purposes they are graded according to size, for jam making the main considerations are the stage of ripeness, the colour, and the flavour. The best varieties for preserving are "Careless," "Keepsake," "Whinham's Industry," and "Lancashire Lad." The first two varieties are preferred to all others for canning and bottling.

Gooseberries for canning and jam making should be gathered when pale green. The pectin content decreases rapidly as ripeness is reached. Ripe gooseberries also have tough skins, which discolour during the bottling and canning process.

Gooseberries for preserving purposes are usually packed in special jute bags containing 40 lb. Half sieves, baskets and old sugar bags are also used. It is advisable to use new bags or sterilised second-hand ones, as jute bags can be a source of infection from the heat-resisting mould *Byssochlamys fulva*. T. G. Gillespy found spores of the mould in old bags which had been used for the carriage of gooseberries (*Annual Report of the Campden Research Station*, 1936-37).

After arrival at the factory the fruits have to be topped and tailed; this is done almost exclusively with the gooseberry snibbing machine, which combines the three operations of topping, tailing and washing. After leaving the machine the gooseberries are cooked until soft and are not sieved.

PLUM

In glut years the supply of plums exceeds the demand. They make excellent jam and are suitable for canning and bottling. Their cheapness makes it possible to produce popular preserves for all classes.

There are a great number of commercial varieties more or less suitable for jam making; for can-

Careless.

ning and bottling purposes a few varieties are outstanding. For jam making it is important to consider the stage of ripeness of the fruit, its colour and its flavour. For obvious reasons a large plum is less wasteful than a small one.

Victoria.

The number of plums per pound varies considerably even in one variety. Tests made through a number of years at Campden Research Station concerning the main distribution of plums per pound showed the following figures:

"Victoria" plums approximately 12 to 13 plums to the pound.

"Pershore" plums approximately 17 plums to the pound.

"Purple Pershore" plums approximately 19 to 20 plums to the pound.

These figures are based on normal average crops. The author checked the average weight of stones for the same varieties and found:

"Victoria" plums 100 stones weighed 150 g.

"Pershore" plums 100 stones weighed 146 g.

"Purple Pershore" plums 100 stones weighed 110 g.

The main commercial varieties suitable for jam manufacture are:

Yellow plums—"Early Laxton," "Gisborne," "Pershore," and "Magnum Bonum."

Red plums—"Victoria" and "Blaisdon Red."

Purple plums—"Belle de Louvain" (grown around Wisbech), "Purple Pershore," and the "Monarch."

The most popular plum for jam making is the "Pershore Egg" plum, and to a lesser degree the "Victoria" plum. The "Czar" is not suitable for jam. Outstanding for bottling and canning are "Victoria," "Magnum Bonum," "Pershore Egg," and "Purple Pershore."

Plums, next to damsons and blackcurrants, show the highest average content of pectin, according to Macara, 0·81 per cent. as crude calcium pectate. As the pectin content declines as the fruit ripens it is essential to pick the plums for jam making while they are still hard. The "Pershore Egg" plum, for instance, should be gathered in a hard, green state.

A great variety of containers are used. Trays of 24-lb. capacity are preferable because they can be handled by women; bushel baskets are suitable, but are rather heavy. For transit, tight packing is essential in order to prevent the bruising of the fruit.

Plums should be washed only if dirty. For jam making they have to be cooked until soft and then either sieved or preserved with stones. A limited number of stones in plum jam emphasises the subtle almond flavour. The waste, consisting of stones, stalks, and deteriorated fruit, was 12·5 per cent. for an average year—1934—spread over 200 tons of fruit.

DAMSON

Damson jam is very popular for its rich and peculiar flavour. According to Campden's investigations, the average distribution of damsons per pound is in the region of 50. The average weight of 100 stones is approximately 55 g. The best variety is the "Shropshire Prune," which is equally good for both jam making or canning and bottling.

Damsons for jam making and canning should be picked when of a uniform purple colour. The same containers are used as for plums.

The preparation of damsons for jam manufacture is the same as that of plums. Damsons have the highest pectin content—1·15 per cent. as crude calcium pectate (Macara)—of all English-grown fruits.

CHERRIES

Only acid or subacid cherries are suitable for jam making, and they can be divided into two groups: (*a*) The sour red varieties or "Amarelles"; (*b*) The sour black varieties or "Morellos."

Good varieties have a very subtle flavour which is difficult to preserve, and so cherry jam is often insipid. The main varieties grown in this country are: Amarelles—"Kentish Red," "Flemish Red," and "Triaux" (a recently introduced French variety); and the representative of the sour black cherry, the "Morello." All these varieties are suitable for canning and bottling.

Cherries for jam making should be picked when ripe, for they develop their full flavour at this stage. If gathered over-ripe they are very wasteful during the stoning process. Cherries travel better if picked with stalks.

Suitable containers are half sieves or trays and boxes of not more than 24-lb. capacity.

Cherries need be washed only if dirty. The next operation is stalking, which is usually done by women at piece rates. The average output per

hour is approximately 22-26 lb. The stoning of cherries is almost exclusively done by machine. The cherry-stoning machine is quite efficient, but it is essential that the fruit be fed accurately beneath the stoner, which requires proper setting. The loss of juice during the stoning process is always considerable; it can be collected and used for other purposes. The waste (consisting of stones, stalks, and juice) during a whole season amounted to 25·5 per cent. After stoning, the fruit is ready for jam boiling or pulping. Very often cherries are used with stones; then the fruit is cooked until soft, but it is not sieved.

CITRUS FRUITS

That the choice of a suitable variety of fruit is of fundamental importance in jam making is a generally recognised maxim in the manufacture of marmalade. Almost every firm producing marmalade has its own production methods and ideas about blending fruits. Before the war the bulk of English marmalade was produced from bitter Spanish oranges of the Seville type. War-time food regulations have limited the maximum quantity of bitter oranges to a mere 12½ lb. per 100 lb. of marmalade. Many manufacturers have blended bitter oranges with sweet oranges, lemons, and grapefruit pulp instead. Some war-time marmalades have a very pleasant flavour, and will probably continue to be made after the war to meet the demand for less bitter varieties. Our main supplies of citrus fruits come from Spain, South Africa, California, Palestine, and Sicily.

After arriving at the factory, oranges should be stored in a cool, well-aired room. First the cases are opened and the fruit sorted according to ripeness. Green oranges are kept separate and left to mature. Ripe fruits are peeled either by hand or by machine; the peel and dummies are kept separate. Modern machines perform the quartering, peeling, separating, and pulping processes in one operation. The average output from peeling by hand is 20-26 lb. per hour. The next stage of preparation varies considerably in different factories. Most frequently the peel is cut with the orange clipping machine and subsequently cooked till soft; the dummies are cooked separately and pulped through a sieve. Finally, the cooked peel and the sieved pulp are mixed. All other citrus fruits are prepared in a similar way.

APPLES

The high pectin content makes apples particularly suitable for jam mixtures, which are used extensively for confectionery purposes as well as for cooking and bread-spreads. Most culinary varieties are suitable for jam making. Apples which turn red when ripe, or are bitter sweet, or have a floury consistency are less suitable.

Only green and hard apples should be used. All types of containers are suitable, as, for instance, boxes, bushel baskets, old sugar bags, etc.

Apples are washed, cooked, and sieved. The cooking should be as short as possible, as apples have a tendency to turn brown.

CORRESPONDENCE

Alternatives to Pasteurisation

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—There is some considerable difference between the statements, "I dislike the taste of pasteurised milk" and "Pasteurised milk is undrinkable." It is surely essential when quoting other writers to use the exact words and not to paraphrase them, otherwise it is possible to twist the meaning to anything one likes. I do not for one moment question Mr. Newall's point that fundamental research on the effects of deep-freezing on milk is worth doing. Some really useful points might arise from such research if carried out under properly controlled conditions.

The aspect that I criticised was the publication of an article which would lead the lay reader to conclude that in deep-freezing we had a process which was superior to or economically comparable with pasteurisation, and which would achieve all the objects which pasteurisation is generally supposed to achieve.

I am not at all impressed by general statements made by prominent people about the taste of pasteurised milk, and I challenge Mr. Newall and Mr. Shaw and anyone else interested to prove in a properly designed and conducted experiment that they can pick out pasteurised from raw milk on taste more times than could be explained by ordinary probability figures. Reference to the experiments described in Professor Wilson's book on *The Pasteurisation of Milk* will show that in these experiments only one person was able to detect pasteurised milk significantly more often than could be explained by the probability calculations.

Mr. Newall has questioned my statement that the cost of deep-freezing of milk would be fantastic, and he asks on what foundation I build that theory.

In order to get an unbiased opinion on the relative costs of pasteurising and deep freezing, I asked some of the leading manufacturers of both pasteurising and refrigeration plant for estimates.

One of the leading firms estimates that it would cost from 0·5d. to 0·6d. per gallon to pasteurise for a rate of 2,000 gallons an hour or 15,000 gallons per day. For a rate of 500 gallons a day the estimated cost is 0·9 to 1d. per gallon.

The cost of cooling from 65° to 40° F. is estimated at 0·3d. to 0·4d. per gallon.

Another firm estimates that to cool 2,000 gallons per hour from 70° to 40° F. would cost £2,600 in plant and require 56 b.h.p., to cool 750 gallons per hour £1,560 and 22 b.h.p., and to cool 100 gallons per hour £260 and 2¼ b.h.p.

On the question of deep freezing one firm writes: "We find it extremely difficult to make an intelligible answer to your question at all. In the first place, deep freezing has never been carried out on any commercial scale and not, so far as we are aware, satisfactorily and properly even on a laboratory scale. . . . We should not be a bit surprised to find that the cost of such deep cooling reached a figure nearer 1s. per gallon than 1d.

Another firm writes: "We agree with your opinion that it would be fantastic to treat milk on the lines proposed both from a practical and economic point of view." After elaborating on the practical difficulties, this firm continues: "All we can do at the moment by way of answering your query is to advise you that the first cost of this equipment (made for another but similar purpose) has amounted to about £7,000 and that the output obtainable when cooling a non-freezing solution to about −100° F. is about 70,000 b.t.u. per hour. The power to drive this plant is approximately 70 b.h.p. Basing on these figures it appears that about 1,000 b.t.u. per hour would be obtainable from 1 b.h.p., and assuming about 2,000 b.t.u. to be removed from a gallon of milk when cooling from 70° to −120° F., the plant would therefore be capable of handling about 35 gallons of milk per hour."

I am, of course, in complete agreement with Mr. Newall that we should give every possible attention to the health of our cows and to the conditions under which milk is produced on the farm and handled in the dairies. In fact, if he refers to my article, "Milk and the Consumer," FOOD MANUFACTURE, December, 1944, p. 425, he will see that I have proposed a revolutionary method of payment for milk in order to ensure that dirty milk cannot be produced economically and to raise the nutritional value of the milk supply as a whole.

Although most persons at present do not like the idea of the replacement of our liquid milk supply by dried milk, it must be remembered that technically the drying of milk is still in its infancy and that the dried milk of the future may bear the same relation to ordinary dried milk of to-day as the modern aeroplane bears to the very primitive type of machine in which Bleriot flew the Channel. Further, public prejudice against dried milk has been largely heightened by the fact that "Household" dried milk, which has been handed out during war-time, is not by any means an example of the best that can be done in the drying of milk.

Mr. Newall states that he, as an engineer, has never yet seen any adequate means of obtaining heat treatment that can be called reliable. Surely the answer to this is that modern pasteurising plant properly controlled can deliver a product which is satisfactory by all the recognised tests—phosphatase test, coli test and any of the tests used as a measurement of keeping quality, such as the resazurin and methylene blue tests. It is true that there are occasions when the most efficient pasteurisation cannot deliver milk of plate count less than 100,000, but this is no fault of the pasteurising plant, but due to the fact that the raw milk is of such a poor hygienic quality that it contains more than 100,000 thermoduric organisms per ml. In any case, this plate count standard is purely arbitrary, has very little relation to keeping quality, and was imposed before large-scale presence of thermoduric organisms in raw milk was properly realised by the Ministries concerned. It is likely that the plate-count standard will be abandoned or modified in the near future.

Mr. Newall states that temperature of pasteurisation has varied quite a lot recently in the minds of the authorities, and the length of time at which milk should be maintained at the temperature has also been moved about. I am not quite certain what Mr. Newall means by this. If he means that the time-temperature conditions required to kill pathogens is still a matter of controversy, then his statement is wrong. Reference to the conclusions of various authorities on this subject (*e.g.*, page 111 in Mr. Arthur Guy Enock's book *This Milk Business*) will show that there is a very close agreement between the authorities all over the world from 1890 down to 1917. The conditions vary mostly from 140° to 145° F. at 30 minutes. The H.T.-S.T. process of 162° to 164° F. at 15 seconds is the experimentally determined condition equivalent to the classic holder process. When saying that the temperature is moved about, the corresponding time must naturally be taken into consideration.

It is true that the modern H.T.-S.T. process is criticised by many people, but this is inevitable when any new process is generally adopted. In many cases failure of the process is not due to the plant or method, but to the fact that control is inefficient and maintenance carried out by inexperienced and inadequately trained workers.

Yours, etc.,
J. G. DAVIS.

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—In his article "Milk Pasteurisation and its Alternatives," Mr. J. G. Davis concludes his article by saying that the ideal method of preserving milk would be to dry it on the farm, but he thinks that we are, perhaps, peeping too far into the future in visualising the farmer of the future pouring his milk not over a cooler but into a drying plant.

It may interest you to learn that as far back as 1924, my father, Dr. C. Knoch (for whom, in earlier years, you published an article) constructed a drying plant for this very purpose. The plant itself cost only £150, and with its accessories came to about £250. It was built as a unit and each unit was to dry about

40 to 50 gallons of milk per hour. The product obtained was better than any roller or spray powder on the market.

He tried to interest the capital of this country in favour of his idea, but could not find any interest for the development of his plant, since he always had to overcome the powerful interest vested in large centralised drying plants. He, of course, had to realise that, although the plant itself worked quite efficiently, the cost of labour is extremely high in comparison with the cost of labour for a large centralised plant. The saving in transport would of course counteract this.

I thought I would write you this letter in order to inform Mr. Davis that his ideas are not so much out of place, and I would be glad if the idea would one day mature, in spite of the opposition which has to be overcome.

Yours faithfully,
H. KNOCH.

Meat Tainted by Fear

TO THE EDITOR OF FOOD MANUFACTURE

SIR,—Humanitarians and hygienists have too long been content with the elimination of pain in slaughter-houses while tolerating the continuance of fear, which to an animal means even more than pain, and moreover renders its flesh unwholesome and therefore unfit for human consumption.

This fear can only be entirely eliminated by the substitution of hope, induced by something appetising in manger or trough in which the animal's head, when about to feed, offers an ideal target to the operator of the captive bolt pistol, the only certainly immediate and permanent destroyer of consciousness.

A leaflet giving ground plan and description of a model public slaughter-house for horses, cattle, sheep, goats and pigs, with its two compartments as against the single compartment of the present slaughter-house, full of terrifying sights and smells, can be had free on application to Mr. Alfred Brisco, Blackwell, Carlisle, and should be applied for by local councillors and electors not only in the animals' interest but also in their own.

Yours, etc.,
S. CLAUDE TICKELL.

Carbon Dioxide Content of Self-Raising Flour

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—I have read with interest Mr. Fairbrother's helpful paper in your April issue. In his concluding paragraph he states that "It might be argued that to allow for possible losses in storage more ingredients should be used, but in practice ingredients which would allow for more than 0·60 per cent. total carbon dioxide would impart an unsatisfactory flavour to the baked goods." In view of the fact that it is a well-established commercial bakery practice to blend and use self-raising flours having a total carbon dioxide content of 0·75 per cent. and that blends with a total carbon dioxide content of 1 per cent. are not uncommon, Mr. Fairbrother's statement appears to require qualification. It may be added that a total carbon dioxide level of 0·75 per cent. based on the self-raising flour is frequently reached in scones and other chemically aerated products in which there is no further farinaceous dilution of the baking powder.

In any case, the influence of chemical aerating agents upon the taste of baked products depends not so much on the percentage of total carbon dioxide based on the self-raising flour, but on the proportion of the aerating agents to the entire product to be aerated.

Although Mr. Fairbrother points out on page 138 that "the most used acid ingredient is acid calcium phosphate," and therefore may be understood to confine his subsequent observations to that material, it is also important to recall that the chemical nature of the acid ingredient of a self-raising flour plays no small part in determining the extent to which the taste of the baked goods is affected.

Yours faithfully,
S. WALTER BUTTERWORTH.

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—Mr. Butterworth's comments on my article are very interesting, but are based more on commercial bakery practice than the domestic applications to which self-raising flour sold to housewives is put.

One agrees that in certain commercial lines—*e.g.*, a special scone popular in Scotland—a flour with an available carbon dioxide content of over 1 per cent. is used. Such high ingredient flours can be safely employed by commercial confectioners using careful discretion, but would be fatal to the ordinary housewife. Self-raising flour for domestic use should be so manufactured as to give the best average results for all types of household confectionery, from a rich Dundee cake on the one hand to a light Victoria sponge on the other. Incidentally, I understand that some housewives making the scones referred to above generally add more bicarbonate to the self-raising flour.

My opinions are based on nearly twenty years' experience as Chief Chemist to a company which is one of the largest producers of self-raising flour in this country and on the public opinions expressed on many trial mixings.

With regard to the last paragraph of Mr. Butterworth's letter. In my article the acid referred to was certainly acid calcium phosphate, as it is the acid mainly used for self-raising flour. One agrees that the flavour is influenced by the nature of the acid ingredient. If, for example, acid sodium pyrophosphate were used in such amount as to liberate 0·75 per cent. carbon dioxide from the soda present, the flavour would be most marked and the manufacturers would certainly receive complaints that the cakes had a "rough" flavour. Believe it or not, the average housewife has a very discriminating palate and is not slow to protest if she feels that the flour has affected adversely the flavour of her cakes.

Mr. Butterworth's views may be of considerable value to commercial confectioners, but the maker of self-raising flour for domestic use must seek to get the best of several worlds, and my long experience indicates that a flour containing balanced ingredients capable of yielding up to 0·60 per cent. carbon dioxide is as far as is safe to go.

Yours faithfully,
THOMAS H. FAIRBROTHER.

The World's Food Supply

The author of this article is the editor of our esteemed contemporary, *Food Industries*, New York. On leave of absence from his usual functions, he is in London on a confidential mission connected with economic warfare. His views on a subject which has recently received considerable attention in the Press will be read with interest.

L. V. BURTON, B.Sc., M.Sc., Ph.D.

THE ONE aspect of the food situation which I consider to be of greatest importance to-day is the future of the world's food supply. Despite many divergent comments in the daily Press, some of which imply an unwarranted optimism, the outlook is not at all reassuring. No one in Great Britain needs any reminder of the continuing need to ration food, for six years of war have made everyone painfully conscious of the problem.

American and British Meat Rations

It is disquieting, however, to read recent Press statements about the generous food supplies that are said to exist elsewhere. Although it is well-nigh impossible to have an up-to-the-minute knowledge of the world food situation in all its aspects, it is disheartening to realise how far from the current truth are some writers such as the following quotation from the Sydney (Australia) *Herald* by its London representative. The item bore no date line, but was attached to a letter dated March 19, 1945:

"Britain Hungry While America Still Feasts. . . . The world meat shortage, but particularly America's disinclination to lower her own food levels even a fraction, may result soon in Britain's inadequate meat ration of 1s. 2d. worth a head weekly being cut still further. . . . The position is that while Britons suffer, American civilians, untouched by direct warfare, are living on high food standards, and that those serving in the American forces receive five times the amount of meat available to British heavy workers. American civilians, if they reduced their food level by a fraction which would not be felt, could ensure the maintenance of Britain's present meagre ration. But the answer from America is that any change in food standards now would affect morale. . . ."

Space will not permit a quotation of the entire story. Enough has been given for the basis of the present discussion. One who has been in Britain, even for as short a time as I, cannot question the very severe rationing that the British have endured for many years. The scarcity of food here is not a matter of debate. But the illusion of a superabundance of foods in America should be scotched. True, there have been times about two years ago when there was an ample supply, for the reason that there were not enough ships available to carry it to places where it had been promised under lend-lease.

The clipping from which the quotation was made was attached to a letter from an American in Australia whose job it has been to procure enough food in Australia under reverse lend-lease to feed the American forces fighting the Japs in the Far East. Said he: "The drought has seriously affected us, has made our procurement much more difficult, and has handicapped the food supply from Australian sources. Recovery is taking place slowly, but canned vegetables, dairy products and meat products will be less in 1945 than in 1944. . . . Judging by letters from my home I realise that Australian publicity on American luxury is a fantastic dream."

And from my own home, in the vicinity of New York, a letter dated April 15 says: "The meat situation is very bad. You will have to like fish—if there is any available when you return."

About March 27, U.S. Under-Secretary of War Patterson gave out a statement to the Press in America that the U.S. Army was forced by the food shortage to curtail the issue of food to other than combat troops. Also it should be recalled that the liberated Philippine population have a moral claim for sustenance upon the U.S.A.

The extreme length of time required for isolated facts known to the ordinary person to become published statistics known to the world at large is responsible for some of the misunderstanding of the basic truth. This time lag may be many months. But there is another source of misunderstanding in America, which is the manufacturer whose warehouses are filled and is unable to get shipping orders for foods that he is required by the War Food Administration, the Army or other governmental buying agencies to withhold from sale to civilians. In the local and short-time view he is confident that food is in generous supply and may even make public statements to that effect. These may be seized upon by critics and given a widespread publicity that may lead many to erroneous conclusions.

I would not deny that, at the moment, civilian America *seems* to have a more abundant supply of food than Great Britain. But I have seen the time, about two years ago, when a guest arriving for dinner brought four potatoes in lieu of candy or flowers and was rewarded with a kiss from his hostess. It is true to-day that North America has a surplus of bread grains. But it is equally true that the United States has no surplus of protein, especially meat. There is not enough available to supply all the needs of the armed forces, lend-lease, and even come close to satisfying the curtailed civilian demand.

Because of an unexpected operation of certain U.S. laws, notably meat inspection, the larger cities get less meat than the smaller ones. This is because the Army purchases only Federally inspected meat that comes from abattoirs usually located in the big centres of population. When I left home in March, poultry was unobtainable, eggs were very scarce, and beef required so many ration points that few could buy it. Oddly enough, I have been served beef more frequently in England, by at least four times, than in a corresponding period in America.

Nearly any American recently from home will tell you he rarely has seen any butter there. Public eating-places serve butter only at breakfast.

I have been served as much bacon at one meal on a Sunday breakfast at a civilian hotel in London as would be served in a week for two persons in my home in America.

Though America is not yet on as restricted a diet as Britain, it is well to dispel the idea that America is the land of plenty that we ourselves used to believe it was. The war has taught many Americans what we never realised before, that the U.S.A. is now a food deficit nation. On the net balance, before our imports were curtailed, we imported at least 5 to 10 per cent. more food than we exported. Sugar, cocoanut oil and other vegetable oils, cocoa beans, coffee, tea, canned salmon from Alaska, bananas and canned pineapple from Hawaii comprise our more important food imports and, of these, only the salmon is a high protein food.

Furthermore, the war-time increases of incomes have led to many shifts of the dietary pattern of previous low-income groups to a higher protein diet. The *per capita* consumption of meat, though considerably smaller than pre-war, is not a measure of the greater decline enforced upon those who previously were regular meat consumers.

Conditions in S. and S.W. Pacific

After my tour of the South and South-West Pacific last autumn, I reported my findings to the War Department, urging a complete re-study of the matter of subsisting troops in the war against Japan. Australia and New Zealand, from whence we were getting about 90 per cent. of our food in the South-West Pacific theatre of operations, were nearing their limit. The drought (speaking of the future from October, 1944) in the southern hemisphere, plus the continued occupation of Ocean Island and Nauru (phosphate fertiliser sources) by the Japanese, was bound to reduce the food production in both Australia and New Zealand. Our troop strength in the Pacific was rapidly increasing. Movement of combat further and further from sources of supply meant that more food would be in the pipeline, and additional supply dumps would need to be set up in many a tropical island or other isolated spot requiring still more food.

It did not require any occult powers to foresee that the expansion of the Japanese war would require in 1945 a considerable drain on the food resources of the mainland of the U.S.A. We could not count entirely on reciprocal lend-lease from Australasia. This foreseeable demand for U.S.-produced foods was magnified in its effect by the results of the Allied miscalculation on expected end of the war in the early autumn of 1944. We in America put on the brakes much too early, for everyone then seemed to think that Germany would collapse not later than mid-October. Certain economic controls were changed that would inevitably curtail pig and poultry and egg production, and the needed corrective reversal of the decline could not be carried out until nearly a quarter of a year had passed.

Lack of Man-Power

Another and much more important factor in explaining the world food outlook is the fact that millions of people have been engaged in various war activities who normally would be producing food. Mechanisation of agriculture has been able to compensate only in part for the lost production.

Any way I look at it I cannot see how the world is to avoid a very dangerous food shortage. Sir John Russell has suggested that Europe will be found to be one vast worn-out farm. Reduced numbers of farmworkers, reduced use of fertiliser, reduced farmlands—*e.g.*, the flooded areas of Netherlands—and drought in the southern hemisphere are not exactly conducive to plenty of food production.

To complicate the situation further are the military developments in May. The collapse of Germany, resulting in the release of prisoners and displaced persons, plus the vast number of German prisoners to be fed unless we are to duplicate the horror camps, plus the complete dislocation of most of Europe's economy—all this has the effect of greatly increasing the demand for food upon the slender resources of the Allies.

I repeat here what I have been saying in America for the past three years: When the shooting stops the demand for food will really begin. VE day is merely the beginning of a war against hunger—an enemy more powerful than Hitler, Mussolini or Japan.

The Food Controls of the Future

Part III

SPECIALLY CONTRIBUTED

Expansion of Proposals—"Bottle-neck" Method of Distribution

THE concentration of foodstuffs through well-arranged "bottle-necks" in their passage from the producing areas should usually result in a lowering of costs, at all events in the long run. This, however, depends on (*a*) the ascertainment, after experience has been gained, of the most efficient size, distribution and staff organisation, (*b*) the utilisation of all by-products, (*c*) the extent to which the wholesale trades adapt their internal structure to the "bottle-neck" method of marketing, and (*d*) the total saving effected in the wholesale trades through centralised grading.

In the course of the war there has been a considerable development of the "bottle-neck" technique, both through the operations of the war-time importing associations and through the use of registered abattoirs, egg-packing stations, milk-testing stations and the rest. It does not, of course, follow that the precise degree of concentration of abattoirs, for example, or the precise distribution of milk-testing stations is the best that could have been devised. But in a case of this nature it is the principle that counts; and the principle is now fairly well understood and accepted by the trades concerned. The scientific expansion of the principle, so as to cover all the raw foodstuffs to which it could be applied, is a matter of time. Some research would be needed and the working of the present system would presumably have to be reviewed.

There can be no doubt that, especially in respect of home-produced foods, the structure of the wholesale trades would be considerably modified, even if the process were a gradual one. But the rationalisation of wholesaling is necessarily an advantage to the State, which must interest itself in the lowering of transport and distribution costs if it is to satisfy both the producers and the consuming public. The problem will have to be faced and its solution is briefly examined in the resolutions of the Hot Springs Conference (Resolutions XXIX and XXX).

On the other hand, a problem of almost equal complexity for the State is likely to be that of the issuing of licences for the management of the "bottle-neck" points of concentration. Some of the local authorities are sure to enter the field, particularly in relation to slaughtering and milk distribution; and there will be a competitive movement in many areas, as between the private concerns and the co-operatives. It might in theory be simpler to have all "bottle-necks" ultimately controlled by the State; but until the other method has been thoroughly tested, there seems no reason to invoke State intervention. The principles upon which licences are granted will have to be established by law; and they will presumably involve a comparison of costs, efficiency, labour conditions and the like, as between one specification and another. The details of the scheme need further discussion; but some credit might from time to time have to be made available, where the Government decided that certain areas of the country were insufficiently equipped for rendering service to the public; and the privileged position of the "bottle-necks" would entitle the State to demand that they should operate on a schedule of minimum charges.

The business of inspection, testing and sampling would necessitate the appointment of a staff of inspectors. Normally this need not be large. The cost of administration could probably be carried by a minute levy on the turnover of the depots. But even if an Exchequer grant were involved, it might be argued that the benefit to the public in having the quality of its food guaranteed would persuade it to stand for this small additional item in the Budget. The stage of technical development has been reached where it is practically impossible for the housewife to judge of the quality of much of the food she purchases, even if she was at any time competent to do so; and some of this function might well be handed over to the specialists. It is of course assumed that the work of such inspectors would extend beyond the guarantee of quality, and that it would embrace also the compilation of reports and statistics, upon which the Government would have to rely in any decisions that were made.

Experience suggests that the usual place for the "bottle-necks" in home-produced food is the point where the foodstuffs are moving from the farm into the first stages of grading or processing. The most convenient point, however, varies from one foodstuff to another; and the stages where the "bottle-necks" were established, both for home-produced and imported foods, would have to be worked out in practice. In peace-time there would be little harm done, in all probability, if certain quantities of the foodstuffs evaded the "bottle-necks" and entered the market through other channels. The "bottle-necks" would have to rely on their efficiency, on their price schedules and on public opinion to attract towards them a large proportion of the marketable food. But from the point of view of the State the important thing is that it should be

able, where need arose, rapidly to effect the concentration of all supplies of a given food through its appropriate "bottle-necks" and thus to assume full control over them. Only through the possession of such reserve powers would the State be able to influence food manufacture and distribution without actual and permanent control; and it is only through the establishment of a system of "bottle-necks" that these reserve powers become an effective instrument in the hands of the State.

The only way in which the State can intervene to raise the quality of home-produced foodstuffs is that of establishing a system of differential prices, dependent upon a reliable system of testing and grading. The plan can only work satisfactorily over a long period, during which the Government has time to make cautious experiments and to estimate the effect of each new price schedule upon global farm prices. Special attention has to be paid to the problem of the small producer; and it will usually be found in practice that various subsidiary schemes have to be devised, if it is desired to protect his interests, such as co-operative purchasing and marketing, the advance of capital on advantageous terms and the provision of services. It is, however, impossible to establish a system of differential prices over a long period except through a producers' marketing board or through a State price-fixing tribunal. If there are no State price-fixing tribunals, there will be marketing boards; and we have seen that there is no guarantee that these will either discourage the less efficient and high-cost producers or establish a differential price schedule that will do all that should be expected of it.

If these points are taken into consideration, there seems little doubt that an economical machine for ensuring the quality of food could be gradually evolved; and it would provide the Government with precisely the machine it needed for the exercise of a pervasive but, one may hope, an unobtrusive influence upon the food markets.

Expansion of Proposals—Stocks and Surplus Disposal

The proposal made for the acquisition and holding of food stocks by certain licensed agencies has two main aspects.

(*a*) It is an extension of the "buffer-stock" principle to a number of foodstuffs. In some cases these might be home-produced, while in other cases this country might act as a depository for overseas produce for which an assured market was known to exist.

(*b*) It is an adaptation of the "surplus marketing" schemes promoted by the United States Federal Government; in this instance also the machinery could be used for the acquisition of surplus produce from overseas, where an agreement to this end seemed beneficial.

Normally it is the custom of Governments where storage of food is undertaken to use the storage capacity at the disposal of any suitable business concern or authority. There is no need to assume any departure from this practice. But if, as has been suggested, a Corporation for the disposal of such food is established, it would have to handle storage capacity and might have to acquire fresh plants. It would, in any case, have to meet storage charges from one of two sources; either they would have to be allowed for in the prices offered for stocks or they would have to be met from the Exchequer, where the State undertook certain measures of storage for security reasons or as part of an international agreement on the holding of "buffer stocks." Since one object in the "buffer stock" proposal is to stabilise market prices for the producers, it seems reasonable to establish slightly lower prices for the surplus produce thus acquired from time to time.

But in any scheme for the disposal of surplus produce, which is designed to maintain the level of producers' prices, the consumer is, of course, deprived of the advantage of an occasional fall in prices resulting from a glut. It is therefore desirable that the scheme should be accompanied by measures intended to bring about a long-term reduction of prices. But even allowing that this disadvantage to the consumer can be overcome, the prices offered for the surplus stock would have to be most carefully adjusted. If farmers are guaranteed to some extent against the risk of surpluses, a surplus in one year, due to local or seasonal fluctuations, might readily become in the following year the normal and accepted level of production. In other words, it sooner or later is inevitable that a ceiling should be set to the rising movement of production.

However, the task of dealing with occasional gluts in such commodities as fish or fruit is a very different matter from that of dealing with the world surpluses of such foodstuffs as wheat and sugar. Each type of food would require its own technique. While in any type of food it might be necessary for the Government to establish a ceiling beyond which it was not prepared to go in the disposal of surpluses, the problem in home production is not likely to arise for many years to come. The potato acreage, for example, will be considerably reduced after the war, when other foods become more available; and in any case, apart from the capacity of canteens to absorb seasonal or local gluts, there is the alternative method of disposal in feeding to stock. Milk has still a large potential market; and evidence suggests that many gluts of vegetables can be disposed of in school canteens and the like. The effect of a surplus marketing scheme, however, extends beyond its immediate application to a temporary glut; it is a necessary psychological factor in an attempt to avoid any return to restrictive practices in agriculture. Apart from other measures for

stimulating agriculture it is probably very limited in its influence; but it is an extremely useful and possibly an indispensable adjunct.

There is, of course, no reason why the list of foods scheduled for surplus disposal should not be extended by the addition of such overseas food as butter, dried eggs, processed fruit and dried milk, which might from time to time show a surplus. But where arrangements of this kind are made with overseas producers, the transaction would have ultimately to be an affair of Governments, with a guarantee that the surplus food would ordinarily be kept off the normal market. It seems possible that transactions of this nature will be entered into among a number of countries even in normal times, as a result of the experience of the working of relief in reoccupied territories. There is, for example, no reason why a surplus of some foodstuff in Australia should not be diverted through this country to the feeding of necessitous groups of the population in, say, West Africa; the scheme is obviously flexible; but its application will depend upon international policy and need not be discussed here.

It still remains true that, wherever such a surplus disposal scheme is operated primarily in the interest of producers, the welfare and social feeding schemes have to be adapted in some degree to the kinds of food available. This has its disadvantages, as the Government of the United States has already recognised. But while the plan is in its experimental stages the difficulty must be met. The suggestion made is that the welfare and social feeding schemes offer a large and fairly flexible market for this purpose. Under canteen conditions, for instance, school children can readily be trained to enjoy many varieties of well-prepared food. Plainly the surplus food would be only part (and often a minor part) of the total requirements for the welfare and social feeding market; but it is a market that can, by its nature, readily absorb surpluses of reasonable size.

The proposal, in brief, is that a Corporation should be established to handle bulk purchases, storage and disposal in respect both of such "buffer stocks" as it was thought desirable to hold and of the food supplies required for social feeding and certain of the welfare food schemes. The State would thus possess a safe market, which would enable it to undertake without the fear of holding unmarketable stocks, a flexible plan for bulk purchases. The Corporation would represent all the authorities and bodies that assumed responsibility for such schemes, though it must be taken for granted that association with the central purchase scheme would be of a voluntary nature. The Government would, however, normally look upon the Corporation as the obvious agent for dealing with all bulk purchases and storage on its behalf, except perhaps in the case of the armed forces.

We shall not discuss further the details of the proposal. For its efficient operation in our own country it would be necessary for market intelligence to be available to the Corporation on any local surpluses of vegetables, fruit and fish. Some transport facilities and possibly processing plants would have to be at its disposal for dealing with the surpluses. But how far such methods of treatment as dehydration or freezing can be made an economic proposition under these conditions is a problem that can only be considered after an examination of the costs. The plan as a whole amounts to the isolation of one small section of the total food market and the use of it as an instrument for the stabilisation of the market as a whole.

Expansion of Proposals—Welfare Food Schemes

A word may here be said about the welfare food schemes of the present Ministry. The recommendations of the Hot Springs Conference suggest that schemes of this nature might be expanded to cover other categories of consumers; and it is obvious that the method has a wide range of application for any Government that wishes to adopt it. All the existing schemes have been successful, some eminently so. But the National Milk Scheme for mothers and young children has features of peculiar interest, because it is concerned not with an income but with a physiological category. That is to say, an expectant mother may obtain the cheap milk simply because she is pregnant, regardless of her income, though an income scale has, of course, been fixed for the granting of milk without payment.

This establishes a precedent of some social value. It seems fairly clear that many of those who can afford to pay the full market price would be prepared to do so; and it may be possible to extend the principle in all other cases—*e.g.*, to schoolchildren, adolescents and old persons. The welfare food schemes are, indeed, not so much schemes of relief as methods whereby society ensures the dietetic well-being of its more vulnerable groups. Viewed correctly, they are evidence of a very tangible kind that society places a special value upon childbirth and child development; and a study of them suggests that psychologically they could be of great influence upon the public's attitude towards these problems.

Future Policy

In this discussion a middle line has been maintained between the extreme of confused idealism and the extreme of drawing up a "blue-print" for a post-war food policy. The time for generalisations has passed; but the business of making definite proposals is an affair of Government. It is, however, necessary to summarise the main proposition and observe where it leads us, even at the risk of appearing to advance a definite plan.

It is assumed that our peace-time policy will be one of high employment and adequate wage levels.

accompanied by relatively unrestricted choice to the consumer on the food market. The only restriction on his choice that might conceivably be involved, after a return to normal food supplies, would result from a deliberate exclusion of certain imported foodstuffs. But in that case he would be restricted in the sense in which he could not at one time purchase tropical fruit; it was not available. The State intervenes solely for the purpose of assuring to the consumer low prices for high quality food; but while this may sound a reasonably simple function, it needs for its exercise, under the conditions of a "competitive" market, an unusually sensitive instrument of Government. The tasks are complex, and they demand for their fulfilment that all aspects of the prices, transport and storage problems should be viewed in their relationship to one another. They could not in practice be divided among several ministries without blunting and desensitising the instrument. It is, however, possible to envisage a peace-time Ministry of Food of no great dimensions but responsible for the smooth working of certain statutory councils and price and quality tribunals.

As an instrument of precision the Ministry would need a statistical department. It would further have the services of an inspectorate; and the members of this inspectorate would undoubtedly account for the larger portion of its *personnel*. It would in addition, as far as one may conjecture, be answerable for several more or less permanent committees:

(*a*) A licensing Board in respect of the "bottle-neck" structure of distribution.

(*b*) Tribunals established from time to time for the fixing of prices and for any process of industrial reorganisation that required the attention of the Government.

(*c*) A stocks and surplus disposal Corporation, concerned mainly with bulk purchase and disposal in respect of social feeding schemes.

It is not pretended that this is an exhaustive list of the agencies through which the Ministry would function. But we may suppose that among the small departments attached to the Ministry there would have to be:

(*a*) A scientific division concerned with the constant review of the country's dietetic welfare and with the measures taken to ensure the quality of foodstuffs on the market.

(*b*) A medical division to review and advise upon the welfare food schemes.

(*c*) An educational division, concerned to influence the food habits of the public in a beneficial direction.

On these no comment need here be made. The educational work of the present Ministry has in the main been successful; but no work in food education can be viewed as other than a long-term undertaking; it would be regrettable if the activities of the Ministry in this direction were prematurely suspended.

The work required of the State is that of the continuous and pervasive regulation of the whole industry through the processes of negotiation and inspection; and this co-ordinating function can only be committed to a Department that has acquired in high degree both the confidence of all the trades affected and the capacity of working with them in partnership. We must, however, again emphasise that there can be no smooth transition from a Ministry adapted to war-time purposes to a Ministry adapted to the needs of a post-war world.

Conclusions

There are two conclusions to be drawn. Firstly, those who advocate the perpetuation of the Ministry must understand the changed conditions of peace; it is indolent thinking to see a peace-time Ministry merely as an extension into normal life of all the essential characteristics of the present Ministry. Secondly, proposals will have to be set forward by the Government for the establishment *de novo* of a post-war Ministry; and time will have to be allotted for the full discussion of these proposals, while the existing controls are still in operation. There can indeed be no smooth transition; but it would be almost equally fatal to permit the process of decontrol to run its course before the peace-time policy came under consideration.

Reasons have been given for the proposals here advanced. They are sound, because they are based on a realistic estimate of the problems that will be confronting the post-war Government. Briefly, it appears to the authors that there would be grave risks in pursuing any other course of action. That the reasons will commend themselves as sound to most sections of the industry, as well as to the general public, we are fully convinced. The public would find little that was controversial about the proposition of a permanent Ministry of Food; it is grateful to the existing Ministry; and it would view with disfavour any return to the unco-ordinated practices of the pre-war world. On the other hand, many of those engaged in food manufacture and trading are prepared to look upon their function as a proper service to the community, provided their freedom of enterprise is protected so far as this is consonant with public interest.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Road Transport of Food

Progress in 1944

H. SCOTT HALL, M.I.A.E., M.I.T.A.

The year 1944 has been relatively quiet as regards Ministerial intervention. New developments in chassis forecast the types of vehicles which will be available in due course.

As a result of the misunderstanding of the Order which came into force on March 31, which takes away from C-licensed vehicles the right to carry goods for hire or reward, it has been erroneously assumed by some people that, in consequence of that withdrawal, all pooling schemes would automatically come to an end, since no C-licensed vehicles would, from that date, be permitted to carry any goods other than those the property of the C licensee. The error arose from some oversight in reading the order and, since it is a matter which concerns food manufacturers who use and own commercial vehicles, most of them operated under C-licences, it will be useful to make the matter clear.

Withdrawal of Concessions

The Order stated that, after March 31, certain concessions in the use of road vehicles under Carriers' Licences and Defence Permits were to be withdrawn, except in special cases. During the war vehicles have been allowed to carry goods for hire or reward irrespective of whether they were used under A, B, C or A-Contract Licences, subject only to the withdrawal of concessions by Regional Transport Commissioners at their discretion.

The Emergency Powers (Defence) Road Vehicles and Drivers (Amendment) Order, 1945, takes away this general authority and restricts the appropriate Defence Permits during the war, in the same way as the equivalent Carriers' Licences were restricted in peace-time. Now vehicles may carry goods for hire or reward outside the conditions of their licences and permits only if their operators have special authorisation from the appropriate Regional Transport Commissioner or consignment notes from the Government Road Haulage Organisation.

Those who mistakenly drew the inference from this Order that the pooling of transport will immediately cease and that each food manufacturer would, from the appointed date, March 31, have to carry his own products only in his own vehicles, had overlooked the condition "except in special cases" and the provision that "operators who have special problems in this connexion should apply to their R.T.C. enclosing evidence."

It should be obvious to anyone, even those only moderately acquainted with the conditions under which road transport is being carried on to-day, that vehicles embodied in any pooling scheme at once become special cases in connexion with which these applications would be made with the certainty that they would be requested to continue to operate the pools as hitherto.

Ministerial Regulations

I have made it a custom in these "Progress" articles to open with a reference to any Ministerial or other regulations governing the transport of food. The year 1944 has been a relatively quiet one in that respect: the Ministries have left us almost entirely to our own devices, possibly because the limit of intervention had, by the beginning of that year, been reached and, as a matter of fact, I can recall no new regulation of importance in that connexion.

Some commendation is undoubtedly due to the Ministry of War Transport for its handling of the road transport of meat. Its claim is that not once in over four years of war has a retail butcher failed to receive his weekly supplies. What is more surprising, considering the blackout and the absence of labels, is the extremely small number of wrong deliveries. The quantities handled are huge: London, for example, consumes some 5,000 tons per week, and this varies little, but many other movements depend on conditions which result from extremely erratic demands.

It is stated that the strength of the Government's chartered fleet of specially constructed vehicles remained fairly constant throughout at about 4,150, and although there have been occasions when that number has been increased by casual hire the total has varied very little throughout the war, although this has meant that both vehicles and men have been worked to the utmost capacity.

The Wholesale Meat Transport Association, which is part of the Government Road Haulage Association, is responsible for this transport, including the carriage of livestock, from either the port of entry or the grading centre, to the butcher. It maintains regular deliveries to 760 slaughterhouses, nearly 1,000 depots and 44,000 shops. In addition to this the organisation has played an important part in the feeding of Allied Forces in this country. Deliveries to the U.S. troops at one period ran into thousands of tons per week, and this work often involved long and awkward cross-country journeys.

"Vulcan" 6 V.F. 3 supplied for food transport.

It is pleasant to be able to turn from this aspect of the subject and contemplate the prospects which await us, as we hope now, in the not too far distant future. The activities of manufacturers of commercial vehicles are an indication of what we may expect, and the fact that some entirely new vehicles are in process of production is a reassuring one.

Vulcan

The activities of Vulcan Motors, Ltd., is a case in point. The company is at present producing two models, both of them 6-tonners. One is fitted with the Vulcan petrol engine and the other with the Perkins P6 oil engine. Each model is available in either chassis and cab form or with the 16 ft. by 6 ft. 6 ins. platform body.

The following brief enumeration of the main features of each chassis is likely to be of interest. The petrol-engined vehicle has a four-cylindered engine with a bore and stroke of 102 mm. and 140 mm. respectively. The engine develops 78 h.p. at 2,800 r.p.m. The clutch is a single dry-plate, the gear-box has four speeds and reverse. The back axle gear is an overhead worm with four-pin bevel differential gear mounted in a separate and easily detachable housing. The Girling-type two-leading shoe brakes are pedal operated on the Lockheed hydraulic system, the hand-brake lever being interconnected, mechanically, to the rear-brake shoes. The tyres are 34 in. by 7 in. straight sided, high pressure, heavy duty, singles on the front wheels, twins on the rear.

In the Vulcan 6-ton oiler the well-known Perkins P6 unit is used. It has a bore of 3½ ins. and a stroke of 5 ins. At 2,000 r.p.m. the output is 65 b.h.p. Some of the outstanding features of this engine include the special design of the spherical combustion chamber, the high-mounted camshaft which eliminates the use of push rods, and the rigidly mounted crankshaft which is mounted on seven bearings.

Dodge

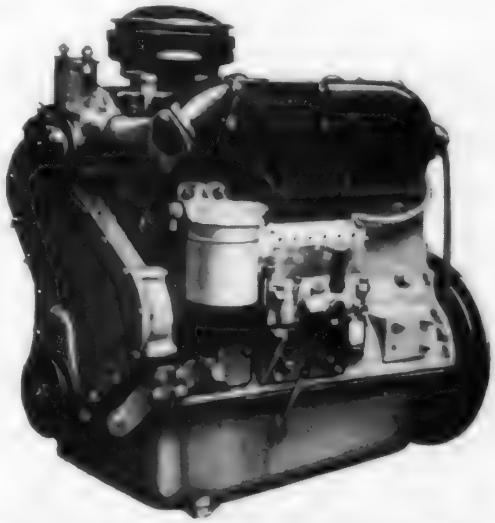
Looking ahead, it may reasonably be anticipated that improvements recently effected in the American Dodge models will be incorporated in the vehicles of that make available on the British market. There are three models, a 1½-tonner with normal control, a forward control machine of the same capacity and a normal control 2-tonner.

The improvements comprise a more robust gear-box, increased braking area, changed position for the steering column, giving more room to the driver, and the addition of certain engine accessories as standard equipment.

Particular importance has been attached to the matter of drivers' comfort. Besides the modification to the angle of the steering column mentioned above, adjustment is provided for the driver's seat and the steering wheels are made of the plastic material known as Tenite.

Austin

The Austin Motor Co., Ltd., promise us six basic types of commercial vehicle in their immediate post-war programme. Two of these are light vans of



Three-quarter front view of the Perkins P6 engine as used in the Vulcan chassis.

82 cu. ft. and 120 cu. ft. body capacity respectively. One is a 2-ton long-wheelbase lorry. The next pair are both 5-tonners, one a long-wheelbase machine and the other a short-wheelbase end-tipper. This last chassis—and here its interest to food manufacturers develops—is useful also as a tractor unit for a semi-trailer or full trailer combination. Additionally, although this is outside our range, there is a coach chassis of 15 ft. wheelbase.

The Heavier Models

Taking the heavier group of models first, all of them employ a six-cylindered o.h.v. engine of 85 mm. bore and 101·6 mm. stroke. The clutch is a Borg and Beck and the gear box provides four speeds forward. The rear axle is a fully-floating one with spiral bevel drive.

Lockheed hydraulic brakes with slotted shoes are used, and, in the case of the long-wheelbase 5-tonner, a Clayton Dewandre vacuum servo unit is provided.

On the 2-tonner the tyres are 32 ins. by 6 ins., singles at the front, twins at the rear, giving a maximum permissible gross weight—that is, vehicle plus load—of 5 tons 5 cwts. The larger types all have 34 ins. by 7 ins. Dunlops, again with twins at the rear, giving the permissible gross weight of 8 tons 5 cwts. The steering-gear includes Thompson self-adjusting rod connexions and the latest roller-bearings-equipped Bishop cam-and-roller mechanism.

Amongst refinements may be mentioned the provision in connexion with the radiator of an expansion chamber in the header tank. The purpose of this is to prevent loss of cooling water. The water pump has been redesigned, and incorporates a special gland arrangement which prevents air being drawn in on the suction side.

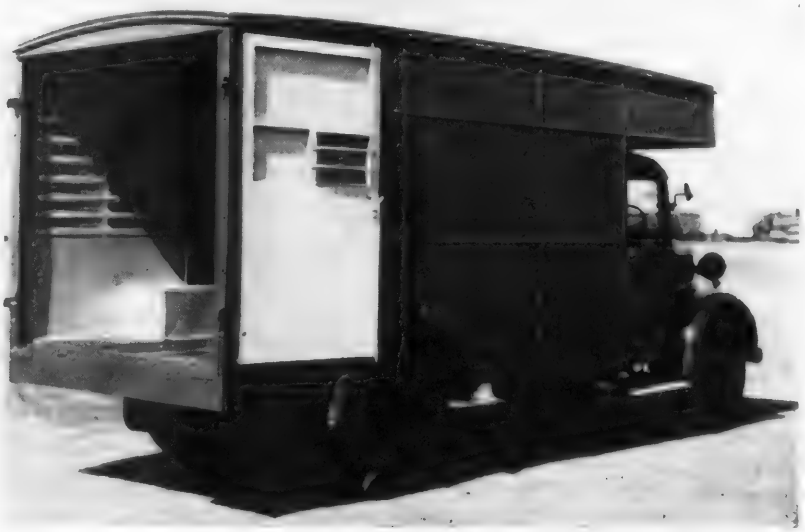
The lubrication system has been modified considerably. In place of the floating strainer in the sump there is now a fixed one of finer mesh and larger area. This provides more thorough cleaning of the oil before it reaches the pump and draws from the cooler depths of the sump.

Some interest attaches to the methods adopted to ensure effective delivery of lubricant to the various bearings. Take the main bearings, for example. There is a large groove or passage running right round the outside of the shell of each; the shell is drilled radially at the four points to distribute oil to all parts of the bearing. The drilled passage leading to each big-end is blocked at its outer end and a second hole drilled at an angle so as to deliver oil to the area of lowest pressure from which it is spread by the motion of the connecting rod bearing.

Delivery of Lubricant

The method of lubricating the camshaft chain is deserving of detailed description. A passage is drilled to the front bearing of the camshaft, which is provided at this point with two axial grooves on the shaft surface leading to the chain wheel. As the camshaft rotates these grooves register in turn with the oil hole and deliver a squirt of oil to shallow dished pressings riveted to each side of the chain wheel. Thence centrifugal force carries the lubricant outwards to the teeth of the chain itself. By delivering one squirt of oil per revolution through the groove in this way all the oil passages can be comparatively large, and thus there is no risk of choking them even if the oil be allowed to become undesirably dirty.

Another interesting feature of the timing gear is the automatic tensioner, which also serves to silence the timing chain. It consists of an oil-proof syn-



Austin 2-ton Box Van.

Front view of the new Sentinel; the driver has a full view of the road in front, this being the result of the absence of the engine from its usual position.

thetic rubber ring placed in the groove between the two rows of teeth serving the duplex roller chain. Its outer diameter receives the chain at the point of engagement and cushions it, at the same time tending to force the rollers outwards from the centre of the wheel so as to maintain a constant tension even when the chain has stretched.

The smaller van (82 cu. ft.) has an 8 h.p. engine, and embodies all the improvements just mentioned in connexion with the heavy vehicles, and similarly with the larger van, which has an 11 h.p. engine.

Sentinel

It is rarely indeed in these days that one has the opportunity to bring to the notice of road transport operators a vehicle of unorthodox design. That, however, is the case with the new Sentinel, made by the Sentinel Waggon Works.

The unorthodox feature is the location of the engine horizontally beneath the chassis frame. Those who have been some years engaged in the operation of road transport and who were familiar with the Sentinel Steam Waggon will recall that the engine in that case was similarly disposed.

The advantage of this arrangement is that it leaves the forward end of the chassis clear for the driver's cab, which can be made roomy and free from all obstructions.

The engine is a four-cylindered unit, having a bore of $4\frac{5}{8}$ ins. and a stroke of $5\frac{1}{4}$ ins.; it develops 85 b.h.p. at 2,000 r.p.m. In view of the comparatively exposed position of the engine, special provision has been made in the design to exclude dust and other foreign matter. The unit is three-point suspended on rubber mountings so that any suggestion of vibration is reduced to a minimum.

The gear-box is unit mounted with the engine in company with a single plate clutch; four speeds forward are provided and one in reverse. The rear axle is of the overhead worm-driven type. The brakes are hydraulically operated, with a servo device for the handbrake.

The following information as to general dimensions of this new feature are of interest. The overall length of the chassis is 19 ft. 4 ins.; width, 6 ft. 8 ins.; height (to roof of cab), 7 ft. 5 ins.; overall length of body, 14 ft. 6 ins.; inside dimension, 14 ft. 2 ins.; width of body, 6 ft. 9 ins.; wheelbase, 11 ft. 6 ins.; wheel track, front, 5 ft. 8 ins., rear, 5 ft. 3 ins.

The Q Type Battery Electric

Another new vehicle from a new source is the Q goods vehicle from the Q Vehicle Co., Ltd. This is a battery electric type machine, and is made in two models, one a 1-tonner and the other a $2\frac{1}{2}$-tonner. The smaller vehicle has a twin tubular welded frame, designed on the backbone principle. The electrical equipment consists of a motor of the series-traction self-ventilated type, supported on the frame by four Silentbloc anti-vibration mountings.

On the larger model the tubular backbone type of frame is also used, but in this case there is only one central member, to which box-section cross-members are electrically welded. A similar type of motor is employed but here two are used, one to each rear wheel. The construction is ingenious, although not entirely new to those having experi-

ence of electrical vehicle construction. The transmission is by worm and wheel, and each motor, together with the final-drive unit, short axle shaft and wheel, are in suspension and individually sprung by a coil spring which houses the worm-gear and an appropriate bracket underneath the rear cross-member of the frame.

A general feature of interest is that the same size battery is standardised on both vehicles, one being provided for the smaller machine and placed in front under what appears to be a bonnet; two are provided on the larger machine and are mounted midway along the length of the chassis, one at each side. The feature is the easy accessibility of the battery in both cases.

In the case of the 1-tonner the overall length is 15 ft. 9 ins; width, 5 ft. 9 ins.; load space, length, 7 ft. 6 ins.; width, 5 ft. 2 ins. In the case of the larger vehicle the overall length of the chassis is again 15 ft. 9 ins.; width, 7 ft. 6 ins.

A Special Vehicle

A vehicle of interesting design has recently been supplied to Batger and Co., Ltd., well-known confectionery concern, by the Capital Motor Co., Ltd. The vehicle is of the articulated type, and its outstanding features are its large carrying capacity and the fact that a single vehicle and driver can be used in conjunction with two or three semi-trailer units. A three-quarter roller shutter and stout tailboard serve to enclose the rear of the van and provide adequate protection for the sweets and preserves which are being carried. The interior dimensions are: length, 20 ft.; width, 7 ft.; height, 6 ft. 6 ins., so that the capacity is approximately 910 cu. ft. There are two interior lights, which derive their current from a battery carried in a cradle slung beneath the chassis frame. One or both lights can be used as desired.

In the side panels at the four corners of the body three-louvre type ventilators are arranged, and, in addition, further ventilation is provided by two revolving-type fittings mounted in the roof.

New Filtration Unit

A new method and new apparatus for oil filtration is of considerable interest to the road transport engineer operating a fleet of vehicles. It is designed to overcome the difficulties which inevitably arise in connexion with the operation of commercial motor vehicles. For instance, if an engine has been reassembled after overhaul it may well happen that dirt has found its way into the sump, oil pipes, or various components lying about in the shop after each has been dealt with in the overhaul process. When the engine is put into operation the filters may be called upon immediately to deal with unusually large quantities of foreign matter. Hitherto the only practical method of circumventing this difficulty has been to fill up the system, run the engine for a few moments, drain it and replenish with fresh lubricant. The new equipment, known as the Slave Filter and made by Vokes, Ltd., provides a commendable alternative.

A welded tubular chassis, mounted on three wheels, which can easily be drawn by a fitter, carries an unusually large filter, having the capacity of 3,000 gals. per hour, a tank and a hand pump for priming the system when the filter is coupled up to the engine of the vehicle.

With the Slave Filter are provided connexions so that the two flexible pipes from the filter can be taken to convenient points on the engine, without disturbance of existing filters. The Slave Filter is thus included in the lubrication circuit of the engine.

When an engine is started the whole of the oil in the system is delivered by the engine's own pump through the Slave Filter for so long as is necessary to ensure that the entire volume of lubricant has been treated. The set is then disconnected, connexions on the engine closed, and the engine is ready for service with completely purified oil.

The trailer portion of the articulated vehicle supplied to Batger and Co., Ltd., the well-known confectioners, by the Capital Motor Co., Ltd.

Trade News

Leaner English Bacon

As a result of the new price schedule for fat pigs to be introduced on July 2, leaner English bacon and perhaps more English pork may be expected.

The reductions in the extraction rate of wheat flour have released more offals for feeding stuffs, and to make full use of these farmers have been encouraged by the prices schedule to produce heavier pigs.

From July 2 the maximum price for pigs will be increased by 2s. per score pounds, but maximum carcass weight to qualify for top price will be reduced from 240 lb. to 200 lb. dead-weight. Prices for pigs of "porker" weight will also be raised, but those of extra heavy weight (over 220 lb. dead-weight) will fetch less than at present.

The Ministry of Food will decide whether the increased number of light-weight pigs suitable for pork will be used for pork or for bacon.

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Britain and Argentine Meat

Addressing the British Chamber of Commerce, Buenos Aires, at a luncheon given in his honour, Lord Luke, chairman of Bovril, Ltd., declared that Britain had reason to be grateful to Argentina for continuous and regular supplies of meat, but warned that Britons, having learned to eat less meat, might forget to eat more meat.

If Argentine producers demanded unreasonably high prices they ran the risk of people changing their tastes to other cheaper kinds of meat. There was also British agriculture, which, having played an important part in the British food supplies, must have a proper peace-time share in supplying the home market.

Lord Luke concluded: "I am not suggesting that we shall cease to require Argentine supplies. Once again, a fair balance must be struck. I hope that both countries will strike the balance which will be equally to each other's benefit."

OBITER DICTA

- The Ministry of Food desires to get away from control as quickly as possible—but this cannot happen overnight.—*Sir Henry French.*
- After the war, when whole milk, including cream, could be "dehydrated," all milk might well be distributed dry.—*"An Expert" to a Leeds audience.*
- People are fed up with cheap quality chocolate; it has become almost nauseating.—*Mr. E. W. Collinson, chairman and managing director of Beech's Chocolates, Ltd.*
- Britain has told Canada that because of a shortage of dollars she will not be able to buy so much food from her as she did before the war. It would be a shame to see our bacon business going into other hands for reasons of mere currency.—*Mr. A. E. Bryan, Canadian Trade Commissioner.*
- German prisoners of war are getting twice as much sugar as civilians in this country, and, as these prisoners are living "on the fat of the land," steps should be taken to get extra sugar for people with fruit in order that more jam can be made. — *Wimborne District Councillor.*
- It has been found that cases of severe starvation can be resuscitated even when they are almost moribund by administering into the veins, or by means of a tube into the stomach, solutions of predigested proteins, glucose, and certain appropriate vitamins.—*Ministry of Food official.*
- The present shortage of certain foods is part of the price it has been necessary to pay for the victories of the Forces in Europe and the Far East. The problem grows greater, not less, with each victory.—*Preliminary statement by Britain, Canada, and the U.S. on the recent Washington conference.*
- If the statesmen can begin to co-operate on a measure such as a world food plan which will tend to unite nations rather than on difficult problems such as political boundaries which divide nations, a world government which will remove the causes of war will gradually evolve by a process of functional development.—*Sir John Boyd Orr.*

The British Aluminium Co., Ltd.

The Manchester office of the British Aluminium Co., Ltd., is located temporarily at Chancery Chambers, 55, Brown Street, Manchester, 2. Telephone No. Blackfriars 8913. The branch manager is Mr. J. R. Whitelegg.

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Canned Goods Trade

Mr. T. Watson (of Messrs. William Brown and Co., Liverpool), who has been vice-chairman of the canned goods trade section of the Liverpool Chamber of Commerce for two years, was recently elected chairman, and Mr. J. H. Brooks (of Messrs. Pelling, Stanley and Co.) was elected vice-chairman.

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Milk and Controls

At the annual general meeting of the Express Dairy Company, Mr. W. A. Nell, in the course of his speech, said:

"Much is being said, rather glibly at times, about the necessity for the removal of controls. Controls are necessary to ensure equity of distribution in times of shortage, and it surely is ridiculous to talk about their removal in respect of any food commodity until supplies more nearly equate demand. It will be some considerable time before that comes about so far as milk is concerned.

Milk producers' prices have been guaranteed by Government subsidy until 1948, so it is reasonable to assume that production will need stimulating for the next two and a half years to maintain adequate supplies. It follows that distribution is going to be no less easy during that period than it has been during the war years. It is reasonable, therefore, to conclude that control of distribution in practically the same form as we have known it during the war years will, at any rate, continue for a similar period.

Nothing would suit us better than to return to our pre-war freedom of trading, but the facts as they exist must be faced, and trading methods must be suited to such conditions."

Canning Merger

We are informed that United Canners, Ltd., have purchased the business of J. and J. Beaulah, Ltd. The following is an abstract of the preliminary notice to shareholders:

"The Board (of United Canners, Ltd., Norfolk Street, Boston) beg to advise that United Canners, Ltd., have entered into an agreement to purchase the whole of the Ordinary Share Capital of J. and J. Beaulah, Ltd., of Boston, for the sum of £105,000, the purchase to be satisfied by the issue of shares in United Canners, Ltd., to the nominal value of £70,000 issued at a premium of 50 per cent.

"This will involve the issue of 280,000 shares at 7s. 6d. each, which will increase the issued capital of this company to £210,000.

"The Board consider that this will be a very satisfactory purchase for the company.

"It is proposed that Mr. Wilfred B. Beaulah, the Governing Director of J. and J. Beaulah, Ltd., will join the Board of United Canners, Ltd."

* * *

Society of Chemical Industry Food Group

The Hon. Secretary, Dr. J. H. Bushill, reports that the meetings of the Group during the present session (1944-1945) have been well up to the standard of the immediately preceding years.

The Group has continued its practice of holding joint meetings with the Provincial Sections of the Society. This year they have been held with the Glasgow, the South Wales, and the Newcastle Sections. The annual meetings with the London Section of the Society and with the Society of Public Analysts and other Analytical Chemists have continued and are now an established custom.

Dr. Cox resigns this year after being Chairman of the Group for a period of three years. The Committee, on behalf of the Group, desire to take this opportunity of expressing their appreciation of his untiring efforts during that most difficult period, and also to welcome Mr. Rendle as the new Chairman.

It may be said that the virility of the Group and its constituent panels during the war period augurs well for even greater activity post-war.

Membership of the Group this session has shown an increase, being 910 compared with 836 last session.

* * *

Kitchen Exhibition

A hundred thousand people attended the recent Kitchen Planning Exhibition at Dorland Hall.

The exhibition was planned by the Gas Industry in consultation with a well-known woman architect, Miss Jane Drew, F.R.I.B.A. Interesting new uses were made of materials such as anodised aluminium, stainless and enamelled steel, and plastics. Imaginative colour treatment was another noteworthy feature. Over a hundred different manufacturers cooperated in the erection of the ten full-scale kitchens and "package" kitchens which were shown fully equipped and furnished to suit all tastes and income groups. In addition, there were a number of independent exhibits.

From the export point of view, there were many enquirers from Australia, Poland, Holland, Czechoslovakia, and South America. The Icelandic Trade Delegation paid a special visit, headed by their Prime Minister.

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New Fish Canning Factory

Plans for the establishment of a fish and lobster canning factory at Lochboisdale, South Uist, are now almost completed, and agreement has been reached between the promoters, an Inverness firm of canners, and the fishermen regarding the price to be paid for live lobsters.

The canners will arrange to collect the lobsters from Harris, North Uist, and Barra, and hope to have the plant in operation this summer.

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A New Photographic Process

Deltex, a new process for the production of clearer photographs, has been perfected by Arnold Behr. This is a purely photographic after-process, giving sharper prints of better reproduction value from negatives, and involves no retouching.

New Appointments

At a recent Board meeting of Thompson Brothers (Bilston), Ltd., consequent upon the death of Mr. F. S. Thompson, the late chairman and director, resolutions were passed appointing Mr. H. J. Thompson, M.I.Mech.E., chairman and managing director, and Mr. J. W. Meredith, A.M.I.A.E., assistant managing director.

Mr. Thompson has recently been elected President of the Wolverhampton Chamber of Commerce.

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Mr. T. H. Fairbrother

Mr. T. H. Fairbrother, M.Sc., F.R.I.C., has been appointed to the Board of McDougalls Trust, Ltd. He has been a Director of the operating company, McDougalls, Ltd., for a number of years, and he is also Chairman of the firm's subsidiary company, T. Rose Hilton, Ltd., Ashton-under-Lyne, Lancashire.

* * *

Mr. S. B. Turner

Mr. S. B. Turner, who has been with BX Plastics, Ltd., since 1931, has now joined the Expanded Rubber Company, Ltd., of Mitcham, where he will occupy the position of Sales Manager. Mr. Turner will still be closely concerned with plastics, however, for the Expanded Rubber Company, Ltd., is a subsidiary of BX Plastics, Ltd. Its activities cover the development not only of expanded rubber products but also of expanded plastics.

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Mr. W. E. J. Hodge

Mr. W. E. J. Hodge, secretary of the River Plate Trust Loan and Agency Company, has been appointed manager and secretary as from April 1 last.

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New Chair of Biochemistry

Dr. H. A. Krebs has been appointed to the newly created chair of biochemistry in the University of Sheffield.

Beef Casings for Export

A correspondent in a letter to the *Meat Trades Journal* calls its readers' attention to the market which will be available on the Continent for English beef casings when exports are permitted. Unfortunately, owing to shortage of labour, most of this output of raw gut has not been processed. With the labour situation becoming easier it will pay English gut cleaners to resume scraping and salting of beef gut, particularly as the export of first-class English beef casings will help in reviving export trade without the equivalent imports being taken.

* * *

Food Education Society Luncheon

Dr. L. V. Burton and Sir Herbert E. Morgan.

The Food Education Society entertained Dr. L. V. Burton, editor of *Food Industries* (U.S.A.), at a luncheon on May 7 at the Waldorf Hotel. The company, presided over by Lord Horder, was a small one, but included well-known medical men, industrialists, chemists, dietitians, etc., representative of most of the activities connected with food.

Lord Horder welcomed the guest of honour in a happily worded speech interspersed with humorous touches. He also sketched out the aims of the Food Education Society, and said that the Society welcomed neither food faddists nor food pundits. "We aim," he said, "to teach the people a little less than we know."

Dr. Burton responded with an entertaining talk and explained the route by which he had entered the food industry. He also gave some accounts of war-time food activities in the U.S. and of his visit on food matters to Australia. Concluding his speech, he said that while he was not a nutritionist, he had made some experiments in connexion with the absorption of vitamin A through the skin. He had found that while some people were able to absorb a given number of units in a few minutes, there was another section of people whose skin could not absorb it under twenty times as long. This latter class were found to be very susceptible to the common cold and other infections.

The guests present were:

Dr. L. V. Burton; The Rt. Hon. Lord Horder, G.C.V.O., M.D. (in the Chair); Mr. A. L. Bacharach, M.A., F.R.I.C.; Mr. H. J. Brownley; Miss Helen Burke; Dr. W. Clayton, F.R.I.C.; Mr. G. E. W. Crowe; Mr. T. Crosbie-Walsh, F.R.I.C.; Dr. J. G. Davis, F.R.I.C.; Mr. J. J. Driscoll; Mrs. J. E. Fox; Mr. J. M. Harrison; Mr. H. Hunt, J.P.; Dr. S. E. Kon; Dr. L. H. Lampitt, F.R.I.C., M.I.Chem.E.; Sir Herbert E. Morgan, K.B.E.; Dr. Eric Murdock; Dr. T. H. Sanderson-Wells, M.B.E., F.R.S.E.; Mrs. Sherson; Mr. W. H. White; and Mr. R. N. Wright, A.R.C.S., B.Sc.

Reading from left to right: Dr. W. Clayton, Dr. L. V. Burton, Lord Horder and Dr. Leslie H. Lampitt.

Personnel Management

Speaking at a conference in the Midlands recently, Sir Miles Thomas, Vice-Chairman of the Nuffield Organisation, said that the need for personnel management as a specialised function had been generally accepted by enlightened employers for a number of years, but that its practice had only become truly widespread during the war. He quoted absenteeism as a case where personnel management could be practised with advantage, saying that in the Cars Branch of the Nuffield Organisation at Cowley, where personnel technique had been developed to a very high degree, unexplained absenteeism had consistently been kept to the very low figure of 0·8 per cent. after nearly six years of working in a blacked-out factory.

Ice Cream Booklet

We have received a well-produced booklet stated to be intended merely for the information of the average individual who has little or no appreciation of the real value of ice cream. Published by Facchino's Purity Biscuits, Ltd., it gives abstracts from the opinions of several authorities, mostly medical, with reference to the value of ice cream as a diet.

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Sunflower Oil

An experiment in growing sunflower seed for conversion into edible oil is being made by Mr. W. Simpson, of Chenies, near Chalfont. It is stated that the value of the seed from this crop will be in the vicinity of £140 a ton.

Companies

Express Dairy Co., Ltd.

Mr. W. A. Nell (the chairman and managing director), presiding at the sixty-sixth annual general meeting of the Express Dairy Company, Ltd., said: The balance sheet shows trading results very similar to last year. The same dividend is being paid on the Ordinary, "A" Ordinary, and Preference shares as last year. The balance carried forward this year is £108,773.

* * *

London Produce Clearing House

At the fifty-eighth ordinary general meeting of the London Produce Clearing House, Ltd., Mr. Geoffrey Swann (the chairman) presided.

The following is the statement by the chairman, which had been circulated with the report and accounts and was taken as read:

"Your directors are eagerly awaiting the day when our produce markets are reopened for trading, in order that this company can resume its normal function of financing and guaranteeing the exchange and distribution of commodities.

With Great Britain's urgent need to export manufactured articles, it is essential to stimulate the flow of commodities to these shores, and I believe that the best method of achieving this object is through the medium of the various commodity exchanges with a fund of experience and expert knowledge at their disposal.

I have grave doubts whether any form of Governmental control can deal as effectively with the many problems that arise, as our British merchants, who have gained a world-wide reputation for their integrity and efficiency.

I can only hope that the whole question may be tackled with sympathy and understanding.

The accounts show little change from last year. Expenses have been reduced by £38 18s. 3d. to £3,252 10s. 4d., while income is £23 18s. 10d. lower at £14,421 3s. 11d.

The net profit of £11,068 13s. 7d. is thus increased by £14 19s. 5d. Your directors again recommend the payment of a final dividend on the Ordinary stock of 3½ per cent., less income tax, making with the 2½ per cent. already paid a total of 6 per cent., less income tax, for the year and the carrying forward to new account the sum of £23,596 14s. 4d."

The report and accounts were unanimously adopted and the dividend recommended was declared.

The retiring directors (Major John H. Drake and Mr. Coventry E. Woodhouse) were re-elected and the auditor (Sir Laurence E. Halsey, K.B.E., F.C.A.) was reappointed.

* * *

Joseph Nathan and Co., Ltd.

At the forty-fifth annual general meeting of Joseph Nathan and Co., Ltd., Mr. Alec Nathan, chairman of the company, presided, and said that as long as excess profits tax is 100 per cent. the profit and loss account can show but little change from that of the preceding war years. The net profit is £77,563, which, when added to the amount brought forward—£32,985—leaves an amount available for distribution of £110,548. After making provision for dividends and placing £20,000 to general reserve, there remains £39,548 to be carried forward. The only change in the balance sheet which calls for explanation is due to the sale of the Greenford property to the subsidiary company, Glaxo Laboratories, Ltd., which has resulted in a reduction of £270,000 under the heading of freehold land and buildings, with a corresponding increase in investments in subsidiary companies.

* * *

H.P. Sauce, Ltd.

At the twentieth annual general meeting of H.P. Sauce, Ltd., Sir Patrick Hannon, M.P., Chairman, presiding, said that: "The profits for the year are sufficient to provide another substantial allocation to reserve fund, which now stands at £740,000, and we have decided, having paid a dividend of 30 per cent. on the Ordinary shares for the past fifteen years, to recommend an increase in the dividend to the extent of a 5 per cent. bonus. As to whether this payment will be repeated will depend on the result of the current year's trading, and the prospects of the company when the time comes to consider the final dividend for next year. This will make our total distribution 35 per cent. on our Ordinary shares, and enable us to carry forward £98,752, in contrast with £98,598 last year. Our profit on trading, including dividends from subsidiary companies, which represents substantially their earned profits, and after provision has been made for depreciation and excess profits tax, stood at £241,835, as against £228,131 in 1943."

* * *

Milling Engineers New Company

Two well-known firms of cereal milling engineers and consultants, who have been competitors for seventy to eighty years, Henry Simon, Ltd., of Cheadle Heath, Stockport, and E. R. and F. Turner, Ltd., of Ipswich, have made an agreement which provides for the formation of a new company to foster export trade in British milling machinery. Its operations will cover the whole of the world except North and South America, Australia, New Zealand, France, Holland, Belgium, and Eire; in these countries existing trading arrangements will continue.

The new company will be known as Henry Simon and Turners, Ltd., with registered offices at 86, Strand, London, and the Board is composed as follows: Chairman: Sir Ernest D. Simon; Vice-Chairman: Mr. A. Leggett; Joint Managing Directors: Mr. J. F. Lockwood and Mr. P. N. Savory; Directors: Mr. G. M. Anderson, Mr. P. G. Hamilton, Mr. P. A. Leggett and Mr. A. H. Leggett.

Both partners in the new company are confident that it will be able greatly to augment exports of British milling machinery. The arrangement should lead to a great increase in exports of milling machinery from Ipswich, and thus be of considerable benefit to the borough.

Henry Simon, Ltd., and E. R. and F. Turner, Ltd., will continue to trade separately in the home market, and it is emphasised that the new arrangement does not provide for any interchange of financial interest or Board representation.

Overseas Items

Canadian Dehydrated Potatoes for Britain

Canada Foods, Ltd., Kentville, have signed a contract with the British Ministry of Food to furnish 3,600,000 lb. of dehydrated potatoes in 1945-46. The contract represents an increase of 60,000 lb. over last year.

* * *

New Weed Killer

An effective compound for killing weeds in grass plots is the result of research conducted by the U.S. Bureau of Plant Industry, Soils and Agricultural Engineering at Beltsville in the Atlantic Coast State of Maryland, it was announced recently by the U.S. Department of Agriculture.

Workers in the Bureau found that water sprays containing a compound called 2,4-dichlorophenolacetic acid (2-4-D for short) gave surprisingly good results in killing weeds in grass plots, lawns, and pastures without damaging the grasses. The compound killed heavy stands of dandelion and narrow-leaf plantain when applied at the rate of 5 gallons to 1,000 square feet (20·5 litres to 100 square metres) of a solution to one-twentieth of 1 per cent. concentration without injury of any kind to the grass. It may prove useful against some weeds in wheat fields.

Other weeds readily killed by the compound include chickweed, pigweed, wood-sorrel, knotweed, and broad-leaf dock. Quantities of the spray containing one-tenth of 1 per cent. of the compound selectively killed white clover, frequently considered undesirable in some lawns. Well-established blue grass was not injured. The creeping bent grasses were much less resistant, yet resistant enough to permit the killing of susceptible weeds without being destroyed themselves.

The plant specialists note variations in the effect of the treatment among different species. It is not likely to be effective on weed grasses such as crabgrass unless used in sufficient quantities to damage desirable grasses. Narrow-leaf plantain succumbs readily, whereas the broad-leaf variety seems somewhat more resistant. Sheep-sorrel, daisy, and yarrow were also relatively resistant to treatment.

For a single application the experimenters used a commercial water-soluble, waxlike "spreader" which facilitates putting the chemical into solution—1¾ lb. (0·8 kilogramme) of the acid and 9 lb. (4 kilogrammes) of the spreader to 225 gallons (855 litres) of water is enough for 1 acre (0·4 hectare) of grass.

* * *

Filtration Process

Development of a simple filtration process by which ordinary water can be converted into the chemical equivalent of distilled water is claimed by the American Cyanamid and Chemical Corp., New York. Equipment for accomplishing this conversion is available in portable and stationary styles.

It is claimed that with these units, designated as Filt-R-Stil, water which is virtually mineral-free is made readily accessible for laboratory and other use. The filtration process is described as being accomplished through skilful utilisation of melamine-derived and other resins developed by the manufacturer.

The final de-mineralised water is said to have an average salts content as low as two parts per million of calcium carbonate, and has been produced as pure as one-half part per million. The process is also credited with removing dissolved carbon dioxide from the water.

* * *

Russians Develop New Apple Tree

In experimental orchards at Omsk, Siberia, Russian fruit growers have developed a sturdy apple tree with a trunk only 12 inches tall.

This constitutes the result of some years' research to discover new types of frost-resisting fruit trees which has been carried out at the Omsk Fruit Growers Institute.—*Reuter's Trade Service.*

Chemurgic Industry after the War

About ten years ago the National Farm Chemurgic Council was organised in the U.S. Its object was "to advance the industrial use of American farm products through applied science." It aims, in short, at maximum utilisation of maximum production.

The men behind the movement believe that greater uses of farm products for purposes other than food might stabilise farm prices at a fair level, and that economic difficulties can be solved through full production in every line. They also maintain that a larger chemurgic research in pre-war times would have increased rubber, tungsten, quinine, and other essential materials in the U.S., a fact which would have added considerably to America's national safety.

It cannot be predicted with any certainty what the post-war era holds in store for the chemurgic programme, but with proper encouragement and favourable conditions the possibilities are almost unlimited.

The U.S. has a carryover of some 11,000,000 bales of cotton, and is harvesting a 12,000,000-bale crop. There is a near world record carryover of wheat in the face of 1,100,000,000-bushel crop. If that production is added to the prospective carryover of U.S. staple crops, it is easy to see why chemurgy may be more necessary after the war than ever before, says the *Chemurgic Digest*. It will be needed to help provide a market at reasonable prices for surplus staple crops and to divert some of the acreage from such surplus crops to those grown primarily for industrial uses.

Chemurgy could create tens of thousands of new jobs and at the same time provide a profitable market for farm crops. It could eliminate the need for paying farmers not to produce or for destroying or giving away farm products.

It seems safe to assume that crops such as cotton, wheat, sorghums, citrus fruits, etc., probably hold unknown possibilities

for new and valuable uses which scientific research will disclose.

Much hope is also attached in the U.S. to the production of protein from cottonseed, which has a high protein content of about 50 per cent. Seed will be furnished free to laboratories in a position to carry on experimental work with it.

Another important field will be the development of soil, rebuilding worn-out soils, etc., which will contribute greatly to the wealth of the U.S. and, maybe, of the entire world.—*Reuter.*

* * *

U.S. Fats and Oils Production

If the United States can maintain its present fats and oils production of 10·9 billion pounds in the post-war period, imports of 2 billion pounds will make it possible to export 1 billion pounds, mostly of edible fats, it is stated in authoritative circles. A considerable pent-up demand in some areas indicates the possibility of a substantial peace-time trade through commercial channels.

Production of fats and oils in 1945 is estimated at 9·8 billion pounds, which, although a decrease from the 1944 figures, is still above the pre-war production.

The principal single item accounting for the increase of fats and oils production in 1944 was the augmented lard output, which reached the record level of 3·3 billion pounds. Inedible tallow and grease also contributed to this expanded output.

Among vegetable oils, soya bean was the most important item in expanded domestic supplies, increasing from 39 million pounds in 1932 to 1,240 million pounds last year. The supply of cottonseed oil of 1,133 million pounds in 1944 was the lowest since 1923.—*Reuter's Trade Service.*

* * *

Brazil Nuts

The War Food Administration of the U.S.A., the Canadian Government, and our own Ministry of Food announced last month that the three countries plan to continue preventing the importation of Brazil nuts during 1945 in order to avoid diversion of workers from the more essential rubber production in Brazil.

New Zealand Increases Butterfat Production

An increase in the production of butterfat by 15,000 tons was the goal set by the dairying industry for the current season. Two-thirds of the production year have now gone, and the latest figures available show that the prospects of success are bright.

After a mild winter, the herds are in splendid condition, and there have been no dry spells such as those which had such an adverse effect last year.

The January output of butterfat showed an increase of 24 per cent., or 8,500,000 pounds, compared with the first month of 1944. Contributing factors were the upward move of over 30 per cent. in South Auckland and of 26 per cent. in the Wellington district. In the first half of the season production showed an increase of approximately 12 per cent., the greatest improvement being recorded in Canterbury.

With rationing of butter for domestic consumption keeping that quantity more or less stable, the Dominion should be able to increase shipments to the United Kingdom by a substantial amount, thus helping to offset any decline in Australian exports and ensuring that the British ration will be maintained.—*Reuter's Trade Service.*

Canadian Fish for Britain

Mr. Ernest Bertrand, Minister of Fisheries, announced an agreement between the Canadian authorities and the British Ministry of Food under which a minimum of 15,000,000 lb. of sharp-frozen cod and pollock fillets would be supplied to Britain from the 1945 Atlantic production.

He said that the quantity might be increased if output permitted.

Arrangements to supply Britain with large quantities of British Columbia frozen fish, and fish products, were in progress.

Allocations were also being made to meet other needs of the United Nations.—*Reuter.*

* * *

Allied Wheat Supplies Adequate

Colonel Olmstead of the War Food Administration told the Senate Food Investigating Committee that the Allies' wheat supplies exceeded estimated requirements by nearly 250 million bushels.

Because of the shipping shortage and other factors, the United States had been required to assume a burden so disproportionate that the success of the entire Allied effort to fill the requirements of liberated peoples was dependent on our ability to use in full supplies available in Canada and Argentina.—*Reuter.*

A Section of a Stream-Lined Cafeteria

Vegetables being prepared for the new cafeteria of the American Boeing Aircraft Company. The cafeteria cost £160,000 to build and can serve 1,600 people.

Kenya Food Factory

An enterprising food factory in Nairobi makes use of Kenya's first-class fruits. The chief products are ketchup from fine Kenya tomatoes and cordial from Kenya limes, with a type of fondant made with local cashew nuts, lemon and orange squash, cape gooseberry jam, and pickles as flourishing sidelines.

Special hygienic methods are being employed. The African workers are admitted to an anteroom where they discard all their clothes and pass naked to another room fitted with a dozen or so shower baths. There, under the eye of the foreman, each man has a hot shower, a lather, and a good scrub with a disinfectant soap. He dons a sterilised one-piece tunic and apron of unbleached calico—a fresh one each morning—and passes into what must be one of the cleanest factories in Africa.

Chloride of lime is used here in bulk quantities—on walls, ceilings, floors, tables, and on certain parts of the plant. Although the huge glass windows are all sealed against outside dust and grass, the air is always cool and fresh. It is changed six times an hour by means of a special ventilation system.

An experienced woman peeler in a British or American factory averages 100 lb. of tomatoes an hour; the Africans are comparatively new to the work and their average output is about 60 lb. an hour, though some of the best peelers often touch 90.

The factory has its own seed nursery, and selected seed is sold to farmers, to be repurchased later in the form of fruit and vegetables.

The growth of such a factory leaves no doubt that there is room for similar developments in the East African territories.

* * *

The U.S. Fruit Industry

According to a report from the Bureau of Agricultural Economics, United States Department of Agriculture, the fruit industry of the United States is now operating at record high levels of production and price. Production of citrus fruits and tree nuts has increased rapidly during the past decade, mainly because of new plantings, increased bearing capacity of planted trees, and good care of orchards. Further increases in production, particularly of citrus fruits, are likely.

The prospective large production of fruits and nuts in the early post-war years is expected, says the report, to face a condition of greatly reduced Government requirements and smaller civilian demand. "This will require a broadening of markets and uses. A resumption of exports of apples and pears should be possible. At the same time, increased imports of bananas and other fruits may be expected, providing increased competition for the consumer's food dollar." Furthermore, materials and equipment should be available to can, freeze, and otherwise process an increasing proportion of the fruit crops. If this can be done at a lower cost per unit of product, new market outlets, as well as old ones, should be reached throughout all seasons of the year. Nevertheless, goes on the report, total supplies of fruit, particularly citrus fruit, are likely to outstrip demand for it at present price levels, leading to sharp downward adjustments in prices.

News from the Ministries

Fisheries Adviser

Mr. C. F. Hickling, senior naturalist with the Ministry of Agriculture and Fisheries, has been appointed fisheries adviser for the Colonies in succession to Dr. E. S. Russell. Mr. Hickling, who will have his headquarters in London, has been port fishering captain at Milford Haven during the war.

* * *

Food Consumption Levels

Limited supplies of the Second Report on Food Consumption Levels in the United States, Canada, and the United Kingdom are on sale at H.M. Stationery Office, price 8d.

This report is the work of a special Joint Committee of the Combined Food Board, and covers consumption levels in the three countries during 1944.

Fruit Pest Research

The Associated Fruit Growers, Ltd., and the Pettar Society of Winter Wash pooled their resources and, in association with the Agricultural Research Council, agreed on a programme of research into the control of the fruit-tree red spider, and subsequently extended the programme to cover the apple-blossom weevil.

A field laboratory has been established in Essex, and in July an experienced entomologist was appointed to the staff of East Malling Research Station to collaborate in these investigations.

While the most notable advances have been made in the knowledge of the life-history of the red spider and in the improvement of the methods of attack, it is thought advisable to continue for at least another season before publishing results.

Control of Milk Supplies

The Minister of Food has made an Order—The Milk (Control and Maximum Prices) (Great Britain) Order, S.R. & O. No. 410 of 1945—consolidating the existing Orders relating to the sale and distribution of milk in Great Britain. This Order supersedes the following Orders:

The Milk (Control of Supplies) Order.

The Milk (Control of Supplies) (Scotland) Order.

The Milk (Retail Prices) Order.

The Milk (Maximum Prices) (England and Wales) Order.

The Milk (Scheme of Supply) Order.

The Milk (Size of Bottles) Order.

The Milk (Use of Bottles) Order.

The Milk (Use of Churns) Order.

The Milk (National Scheme) Order.

The Milk (Sales to Distributors) Order.

The opportunity has been taken to simplify and modify certain of the existing control provisions. The modifications include changes in the conditions applicable on the sale of milk to distributors in England and Wales by the Minister of Food, the prescription of maximum prices for homogenised and Kosher milk sold in England and Wales, the extension to milk crates of the existing restrictions on the use of milk churns, and the prescription of maximum retail prices for milk sold in certain counties in Scotland. The Order also now includes a provision controlling the supply of milk for manufacturing purposes.

The Order revokes the existing provisions relating to the licensing of persons who sell milk by wholesale.

The Order came into operation on May 1, 1945.

* * *

The Labelling of Food (No. 2) Order, 1944.

The Minister of Food has made an Order, S.R. & O. No. 464 of 1945, amending the Labelling of Food (No. 2) Order, 1944, S.R. & O. No. 1447, to permit the sale of ice cream and canned vegetables without a declaration of the ingredients appearing on the label. Canned vegetables must, however, comply as regards composition with the requirements of the Canned Fruit and Vegetables Order, 1945.

A similar exemption from the declaration of ingredients is also provided by a general licence for a limited period for custard powder, free running salt, and iodised salt. The purpose of this licence is to give manufacturers and packers of these products up to October 31, 1945, to include on the labels the declaration of ingredients which will be required in the absence of a prescribed standard for these products. Wholesalers and retailers are given three and six months respectively beyond that date in which to sell these products without the declaration of ingredients on the labels.

Butter Boxes

The Ministry of Food announces that the collection of butter boxes through the agency of Container Recovery Service of S.P.D., Ltd., has been insufficient to meet the demand from the food trade.

The original scheme has therefore been extended and now covers the collection of New Zealand wooden boxes, New Zealand fibreboards (not including the fibre/wood-end type) and Australian wirebound butter boxes.

The allowance payable by Container Recovery Service is 6d. per complete wooden box (5d. without lid) and 2d. each for fibreboard cases.

* * *

Purchase Tax

In future, Purchase Tax at the rate of 33⅓ per cent. under Class 9 of the Schedule will be chargeable on wire utensils used in the preparation of food within the amended trade sizes shown below:

Batter, paste, egg and cream mixers, beaters, whisks and whippers—less than 12 ins. in length.

Cake coolers and pastry trays—less than 25 ins. in length or diameter.

Circular frying baskets, whitebait baskets and other cooking baskets—less than 8¾ ins. in diameter.

Skimmers and ladles—less than 6 ins. in bowl diameter.

Double grid irons—less than 18 ins. in length overall.

Cooks' sieves—less than 12 ins. in diameter.

Articles exceeding the trade sizes specified are regarded as exempt from tax only if they are of a type designed primarily for use in bakeries, fish-frying establishments, food factories, shops, and the like, and are not suitable for domestic use.

* * *

Appointment

The Minister of Fuel and Power has appointed Air-Commodore O. R. Gayford, C.B.E., D.F.C., A.F.C., F.R.G.S., to be Regional Controller for the Eastern Region of the Ministry of Fuel and Power, with effect from May 1, 1945, in succession to Mr. W. W. Marsh, C.B.E., who has resigned.

Consolidation of Orders

The Canned Fruit and Vegetables Order, 1944, and its amending Orders have been consolidated and re-issued as the Canned Fruit and Vegetables Order, 1945, which came into effect on May 1, whereby provision is made regularising normal trade practice in the canning of vegetables by additions to the First Schedule. These relate to the use of sugar, salt in brine, colouring matter, and the composition of beans in tomato sauce (as they are now officially described) and macedoine (vegetable salad).

The labelling of bottled fruit will henceforward be subject to the Labelling of Food (No. 2) Order, 1944, and the requirements formerly contained in the Third Schedule to the Canned Fruit and Vegetables Order are now omitted.

There is no change in the maximum prices of canned fruit and vegetables.

* * *

The Food Standards (Liquid Coffee Essences) Order, 1945

The Minister of Food has made an Order, The Food Standards (Liquid Coffee Essences) Order, 1945, S.R. & O. No. 389 of 1945, prescribing standards for "coffee essences."

Liquid coffee essence or extract and liquid coffee and chicory essence or extract are required to contain not less than 0·5 per cent. and 0·25 per cent. respectively, weight in volume, or caffeine derived from coffee. The products must not contain extractives from any roasted vegetable matter other than coffee, or coffee and chicory, as the case may be. In any proceedings, it is a defence to prove that not less than 4 lb. and 2 lb. respectively of coffee per gallon were used to make the essence.

The Order comes into operation on July 1 in respect of sales by manufacturers, on September 1 in respect of sales by wholesalers, and on December 1 in respect of sales by retailers.

* * *

Dr. H. D. Kay

Dr. H. D. Kay, Director of the National Institute of Dairying at Reading, and Technical Adviser in Dairying to the Ministry of Agriculture, has been elected a Fellow of the Royal Society.

Information and Advice

Sipple's Tables

9,853. *Required original source in the literature of Sipple's Tables for concentrating tomato pulp and paste.*

The reference required is *Control of Concentration in Production of Tomato Pulp and Paste*, by H. L. Sipple, *Food Research*, 1936, I, 146-162. Sipple mixes 50 g. of the paste with 100 g. of water, mixes thoroughly and filters. From the refractive index of the filtrate the total solids can be found in a table he gives. His table ranges from 9 to 37 per cent. Total Solids. Sipple's total solids are solids for the paste, although he makes his calculations on the filtrate only.

Mites in Cereals

9,933. *We have been importing cereals from South America, and due to the delay in transit it is sometimes many months before the goods reach us; in some cases we find that microscopic examination shows that mites are present and we are advised to sterilise before sale. So far the only affected goods we have received have been pearl barley and cornflour. Can you suggest a suitable method of sterilisation, and what heat and for how long, should be employed?* (Eire.)

Adult mites can be removed from finely ground products by means of fine silks such as are used in a flour mill. This procedure will not, however, remove the minute eggs, and hence the sieved product may exhibit reinfestation with adult mites if stored for a sufficient time under conditions favourable to the hatching of the eggs. The only manner in which continued sterility (apart from reinfestation by extraneous mites) can be ensured is by the application of a treatment which kills not only the adults but also the eggs.

Fumigation has been successfully employed for the control of mite infestation, and chloropicrin and carbon disulphide have been specially recommended for this purpose. The egg and hypopus stages are, however, particularly resistant to fumigation, and it may be necessary to effect a second fumigation after an interval of two to three weeks.

Drying of the material is the most effective means of control. Mites require a high relative humidity in order to thrive and multiply, and they are unable to survive at comparatively low humidities. In materials in bulk, the humidity, except at the surface, is determined by the moisture content, and if this is sufficiently low, mites will be unable to survive or the eggs to hatch. A moisture content of 11 to 12 per cent. should prevent infestation. If facilities are available for drying the material down to 11 per cent. moisture and the product is not detrimentally affected by such drying, this procedure would be the most effective method of control. It has the further advantage that, if any subsequent increase in moisture content is avoided, reinfestation cannot occur.

Freedom from living mites can also be obtained by suitable heat treatment. If this heating leaves the material with a moisture content of 12½ per cent. or more it will not prevent subsequent development of a mite population should the material become reinfested from an extraneous source. The time and temperatures required for the control of an existing mite infestation vary with the nature of the material and with the species of the contaminating mites. Conditions which have claimed to be efficacious with wheat flour are 1 hour's heating at about 66° C., or 12 hours' heating at 50° C. If a material can be subjected to a temperature of, say 80° C., sterilty would be obtained in considerably less than an hour.

Information Supplied

9,926. *Patent for the extraction of coffee.* (Eire.)

9,927. *Name and address of suppliers of dried egg whites.* (Sussex.)

9,934. *Information regarding the possibility of obtaining bulk supplies of pectin in powder form.* (Kent.)

9,935. *Required details of a tunnel dryer for starch.* (Eire.)

9,936. *Information regarding supplies of dehydrated bananas.* (Sussex.)

9,937. *Names and addresses of firms possibly supplying white of egg substitute.* (Cheshire.)

9,941. *Information required on the matter of improving the texture and keeping qualities of ice cream cones and wafer biscuits.* (Eire.)

9,956. *Name and address of a British firm making machinery for packing 5- or 7-lb. blocks of processed cheese.* (Lancs.)

9,957. *Names and addresses of gelatine manufacturers in England and Scotland.* (London.)

9,958. *Information regarding the handling of retorts in meat canning.* (Australia.)

9,959. *Details of the manufacture of pickles and sauces.* (Staffs.)

9,960. *Required a standard formula for the preparation of jelly crystals suitable for the catering trade, the formula being a normal peace-time sweetened article.* (Middlesex.)

9,972. *Information regarding jam filling machines to fill jars with jam containing stones and whole fruit.* (Staffs.)

9,973. *Names and addresses of firms making machines for flaking, nibbing, and splitting nuts for a large output.* (Surrey.)

9,995. *Names and addresses of firms who manufacture decorticating machines for lentils.* (Leicester.)

9,997. *Names and addresses of the manufacturers of machines for grading, topping, and tailing stringless beans.* (Lincs.)

9,998. *Required the name and address of a manufacturer of a small electric freezer to make ice cream on a small scale.* (Leicester.)

9,999. *Names and addresses of firms which supply dried and concentrated fruit juices.* (Sussex.)

10,000. *Required a formula for a high-class quality ice cream powder.* (Lancs.)

10,002. *Names and addresses of manufacturers of machinery suitable for producing breakfast cereals.* (Warwicks.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in the Manufacture of Canned Sausages

The invention broadly consists in a method of manufacturing canned casingless sausages which comprises the steps of filling the raw sausage meat into a can, pressing a cutting device whose cutting blades have been lubricated into the mass of meat so as completely to subdivide the meat into separate discrete portions, withdrawing the cutting device and thereafter processing the meat in the can in the usual way.

The preliminary lubrication of the cutting device is of great importance in practice as it facilitates the insertion of the cutting device into the meat and prevents the latter from sticking to the cutting blades when the device is withdrawn, so that the sausages are formed with a smooth even surface.

Lubrication may be effected by means of an edible liquid oil or liquefied fat, as, for example, by dipping the device into the oil or fat before it is pressed into the meat. This, in addition to lubricating the cutting device, has the further advantage of coating the sausages with a thin film of oil or fat, which helps to keep the sausages separate during the subsequent cooking and sterilising operation.

The cutting device may be operated by hand or mechanically.

In its simplest form the cutting device may resemble the type of radial cutter which is used, for example, by bakers for dividing dough into a number of separate portions and which comprises a plurality of blades or fins emanating from a common centre. The device should fit snugly into the can so as to be in sliding contact with the inner wall or walls of the can, and the blades should be of sufficient length to extend through the whole depth of the meat so that when the device is fully inserted into the can the blades will form partitions between the adjoining meat portions. The blades may be flat or curved and should be of such thickness—for example, one sixteenth of an inch—as to leave between the individual portions a narrow but distinct continuous gap which will substantially prevent or minimise the risk of the portions reuniting or coalescing after the cutting device has been withdrawn. The number and arrangement of the blades may be varied as desired, and the sausages can thus be produced in different shapes and sizes.

Whereas in the canning of the normal cylindrical sausages considerable air spaces are of necessity left both between the individual sausages and between the sausages and the walls of the can, it will be appreciated that with the method according to the invention the can will be substantially completely filled by the sausages. On opening the can, however, the sausages, although tightly packed, can be readily separated and substantially retain their form during the process of preparing them for the table.

567,004. T. Wall and Sons, Ltd., and Gerald Lothian Forster.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

567,096. B. B. Chemical Co., Ltd., Puddefoot, L. E., and Swire, W. H.: Adhesive bonding of surfaces or in or relating to adhesive compositions suitable for use therein.

567,109. Bean, A. W., and Pearson, F. L.: Apparatus for distributing seed or powdered and like materials on the ground.

567,158. Westwood Rim and Patents, Ltd., and Westwood, S. C.: Filters or sieves.

567,162. Marconi Instruments, Ltd., and Jackson, J.: Electrode assembly for *p*H measuring systems.

567,187. Shakesby, L., Smith, S. H., and Imperial Chemical Industries, Ltd.: Means for conveying liquids from or into containers.

567,193. Cooper, J. R.: Machines for planting potato and other seed.

567,194. Bomford, D. R.: Implements employed in agricultural operations such as the transplantation of cabbage and like plants and the sowing of seed.

567,202. Templeton, R. A. S., and Farmers' Marketing and Supply Co., Ltd.: Preservation of vegetables and other moisture-containing food materials.

567,270. Wall and Sons, Ltd., T., Stanley, E. C., and Henson, A. H.: Preservation of vegetables.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

SIMLAC.—629,981. Flour, bread, biscuits (other than biscuits for animals), cakes, pastry, confectionery (not medicated), and flavourings for food (other than essential oils). **Commonwealth Products Ltd.**, 21, Abercromby Place, Edinburgh, Scotland; Manufacturers and Merchants.

OCEAN SPRAY.—630,172. Cranberry Sauce. **Cranberry Canners Inc.** (a Corporation organised under the laws of the State of Delaware, United States of America), Main Street, Hanson, Plymouth County, Massachusetts, United States of America; Canners. Address for service is: c/o F. J. Cleveland and Co., 29, Southampton Buildings, Chancery Lane, London, W.C. 2.

SNOWSEEDS. — 630,592. Tapioca. **J. D. Brunt and Co., Ltd.**, City Buildings, Old Hall Street, Liverpool, 3; Manufacturers and Merchants.

UPTOO.—630,736. Preserved, dried, and cooked fruits. **Ernest Marshall**, trading as **Copper Kettle Preserves**, Chester Walk, Cheltenham Spa, Gloucestershire; Manufacturer.

New Companies

J. S. Watson (Newcastle), Limited. (390345.) Printon's Buildings, Wolseley Road, Newcastle-on-Tyne. To carry on bus. of manufacturing confectioners, etc. Nom. cap.: £500 in £1 shares. Dirs.: Eva Watson, 18, Loraine Row, Tynemouth; G. S. Watson, 2, Meolburn Avenue, Cullercoats; F. J. Watson, 5, Appletree Gardens, Walkerville, Newcastle-on-Tyne.

Laboratories for Applied Biology, Limited. (390349.) To take over a bus. carried on by Berthold P. Wiesner at 9, Weymouth Street, Marylebone. Nom. cap.: £1,500 in £1 shares. Dirs.: M. D. Mott, 22, Beaumont Court, W. 1; J. Rabinovitch, 22, Beaumont Court, W. 1.

Turner Bros. (Supplies), Limited. (390391.) School Road, Hampton Hill, Middlesex. To carry on bus. of manufacturers of confectionery, grocery, haberdashery, toys, jewellery, stationery, chemicals, etc. Nom. cap. £2,000 in £1 shares. Dirs.: W. Oldham, 57, Rutherwyke Close, Stoneleigh, Ewell, Surrey; J. D. Mallinson, Salisbury Road, Hants.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.